PROCEEDINGS

OF THE

MADRAS GOVERNMENT

IN THE

PUBLIC WORKS DEPARTMENT,

IRRIGATION BRANCH,

FOR THE

MONTH OF JULY 1890.

Printed by Authority.

MADRAS:
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1890.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

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PUBLIC WORKS DEPARTMENT,

IRRIGATION BRANCH.

PROCEEDINGS OF THE MADRAS GOVERNMENT,

FOR THE MONTH OF JULY 1890.

Irrigation.
Account.

READ—the following papers :—

From Colonel J. PENNYCUICK, R.E., Chief Engineer, Periyár Project, to the Chief Engineer for Irrigation, dated Kodaikánal, 19th May 1890, No. 844 P.R.

I have the honor to submit, for the consideration of Government, a report by Mr. Mackenzie on the turbine supplied for driving the air-compressors for working the tunnelling machinery at the Periyár.

2. Every statement made in this report has been verified by myself.

3. The first defect noticed, namely, the admission of water under the full working head to the space between the guide blades and the end of the turbine shaft, is one which I could not have believed possible in a machine sent out by a respectable firm.

4. The effect, inevitable of course, was that the turbine and shaft were forced away from the guide blades, which are rigidly fixed. The pressure was sufficient to cause the screws which fastened the clamp mentioned in para. 1 of Mr. Mackenzie's report to plough along the shaft.

5. This defect was got over by boring holes in the casing to allow the water to escape, but of course at a certain loss of water.

6. The clearance between the turbine and guide blades is also in my opinion a clear indication of bad work or bad design; it leads to an enormous loss of water accompanied by a serious loss of power from friction; the former has been partially remedied by fixing an annular plate over the joint, but the latter remains. The contrast between this turbine and that supplied by another firm for driving the wire tramway is very remarkable; in the latter the junction between the turbine and guide blades is a mere mathematical line, and it would be impossible to insert the blade of a knife into the joint.

7. The net result is that the turbine is only able to drive the compressors by the inlet valves at one end of one cylinder being kept permanently open, so that the piston of that cylinder does no work during the stroke towards the open end, in other words only three cylinders full of air are compressed during each revolution of the compressor crank shaft instead of four, so that the compressors only do three-fourths of their proper work.

8. When the fourth set of valves is allowed to work we cannot get more than 20 lb. pressure in the receivers.

9. With three sets of valves the machinery works pretty easily, and the pressure in the receiver can be got to about 45 lb. which falls below 30 lb. when four drills are at work. In point of fact we have never been able to keep four drills properly working and have to be content with three.

10. It must be clearly understood that there is no question that the defect is solely in the turbine; it is certainly not in the fitting of the machinery which runs so easily that the compressor shaft can be turned by a man pulling at the driving belt; neither is it in the quantity of water, as the machinery has been tested with the reservoir at the top of the turbine pipe constantly overflowing, *i.e.*, with the supply channel bringing down more water than the pipes can carry off. The capacity of the latter is also ample as they carry more than 5 cubic feet per second, an amount sufficient, if properly used in the turbine, to give fully 60 horse-power instead of the 35 or so, which is about what the turbine actually developes.

11. I am not sufficient of an expert to say positively whether the defects are due solely to the bad construction mentioned above, or whether, apart from this, the turbine is of insufficient size. I am inclined to think the latter is the case, and that the diameter should have been at least 6 inches greater.

12. The contractors for the tunnelling machinery are Messrs. Schram and Company, but the turbine, though supplied by them and on their responsibility, is manufactured by Mr. A. Rigg, a well-known mechanical engineer, whose reputation as a scientific mechanic renders the deficiencies mentioned all the more surprising.

13. I trust that the India Office will be able to make early arrangements for the supply of a more powerful turbine so that the full estimated rate of progress with the tunnel can be obtained. The question of pecuniary responsibility for the defects reported is an entirely secondary, though not unimportant, matter.

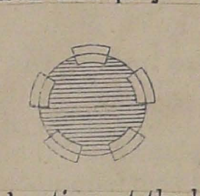
ENCLOSURE.

From A. T. MACKENZIE, Esq., Executive Engineer in charge of Thekady Sub-Division, to the Executive Engineer, No. I Periyár Division, dated Thekady, 14th January 1890, No. 472.

I have the honor to submit the following particulars concerning the tunnel turbine.

1. When first put up no work could be got out of it, as there was a very powerful pressure outwards, which moved the shaft along its bearings and threw the buckets out of line with the guide blades. A strong clamp was fixed with screws against the first bearing, but the pressure was so great that the edge of the bearing became very hot and was rapidly wearing away.

2. The causes will be seen on reference to the rough sketch enclosed. The part in pencil is the guide blades, that in ink the buckets. Lubrication was to be accomplished by water running through a half-inch hole, marked *a*, in the iron spindle A. The outside of this spindle was pieces of *lignum vitæ* let into the iron and projecting from it so as to allow passages between, thus in cross section,

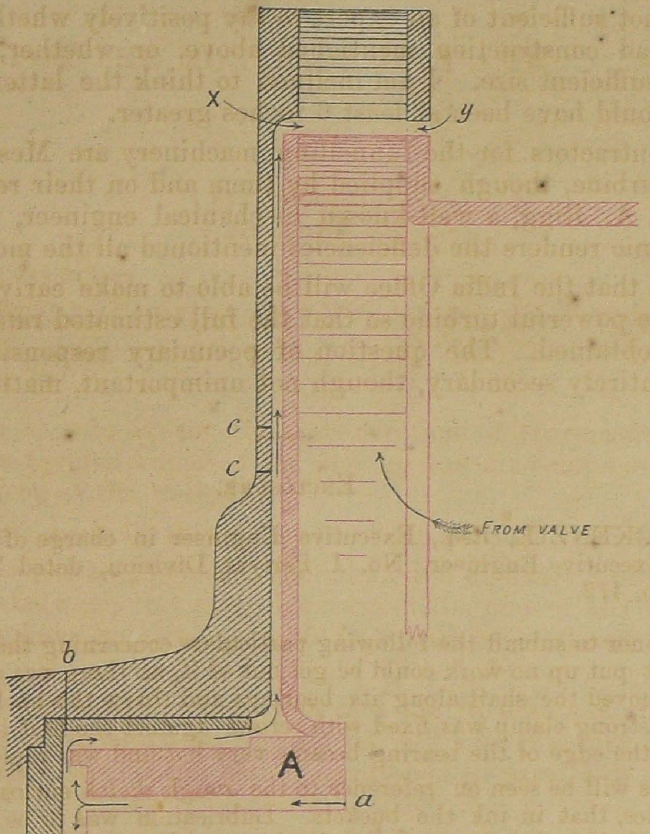


the water being intended to pass through these passages along the course marked by the ink arrows and be merged in the stream running from the guide blades to the buckets. It would not do this as the stream ran with a velocity due to 150 feet of head and so it remained shut up, supplemented by leakage between guide blade and bucket castings, where there was a clearance of one-eighth inch. Consequently this water pressed on the whole of the area of the inside of the bucket casting, with a force due to the 150 feet of head acting at the hole in the spindle. The diameter of the surface exposed is about two feet, so that the pressure tending outwards amounted to some 30,000 lb. Holes were drilled down to the spindle at *b* and also through the casting at *c c*, out of which the water spurted violently. This relieved the pressure, but there was still always water in the space between the castings, which acted as a brake when the buckets revolved. Eventually an annular plate was fixed inside at X so as to cover the clearance of one-eighth inch to prevent leakage and fill up the interior.

There was also a great waste of water at Y, where another plate had to be fixed.

3. These points show bad design of turbine. If the clearance of one-eighth inch was unintentional, it shows bad workmanship.

4. The discovery and redress of these defects took some time and caused infinite trouble; but now that they are remedied I am forced to the conclusion that the turbine is not strong


x
y
c
c
FROM VALVE
b
A
a

enough for the work it has to perform. It has never been able to work both compressors satisfactorily. Unless one set of inlet valves is removed, the machine is brought almost to a standstill. With only three useful piston strokes out of the four, it runs easily, but cannot keep more than 30 lb. pressure on the gauge if all four drills are running. The consequence is that instead of getting out 7 feet of the tunnel per diem it is very hard work to put in holes to bring out 5 feet and the machine-men have often to be paid over-time. The compressors are not in fault, since one man can turn the whole machinery by the pulley on the turbine shaft. Nor is it want of water. The turbine will not take as much as can be given. Nor is it anything in the fitting and erection, for I need hardly say every part has been minutely tested and examined in order to find out what is wrong. Nor is it lack of head, since the turbine was designed for only 120 feet and there is over 150 feet actually.

5. I think we ought to have a more powerful turbine, which can easily be fitted on to the existing shaft and pipes as they stand. More water can be supplied if necessary, but it will be best to use the existing 10-inch pipes, allowing for the extra velocity in them.

EXTRACT from demi-official from the Chief Engineer, Periyár Project, dated 30th May 1890.

* * * * *

The specification given *by me* for the tunnelling machinery was that *it was to be capable of piercing a tunnel* 12′ × 7½′ *to a length of seven feet in a day ;* to which was afterwards added on a comparison of other relative cost of working in one shift or in two that the boring was to be done in a single shift, which of course required rather more powerful plant than for the shifts.

The turbine was to be able to supply the necessary power under a head of 150 feet

All details were left to the manufacturers who supplied the detailed specifications.

* * * * *

The original of the detailed specification submitted by Messrs. Schram and Company must be on record in the Store Department of India Office. Those that I have are copies given me by the India Office. It is essential that the new turbine should be capable of using the existing pipes and sluice valve and of being fitted on to the existing shaft; the dimensions of all of these are I think shown on the plans that I have sent you, but if not they will be found in the specifications. The connection with the compressing machinery is shown on the plan, but this need not be taken into consideration as it is not affected by the alteration in the turbine.

The plans are on a rather small scale, but the makers are sure to have detailed drawings of the whole plant.

* * * * *

(True Extract.)

(Signed) J. PENNYCUICK, Col., R.E.,
Chief Engineer, Periyár Project.

No. 87 I.

Letter No. 844 P.R., dated 19th May 1890, and extract from demi-official of 30th May 1890 from the Chief Engineer, Periyár Project, dealing with the serious

imperfections in the turbine supplied from England for driving the air-compressors of the Periyár tunnelling machinery, are submitted to Government with a recommendation that the Secretary of State be addressed with a view to a more powerful and better turbine being supplied with as little delay as possible, and to the fixing of the pecuniary responsibility for the defective apparatus supplied by Messrs. R. Schram and Company.

Ootacamund,
9th June 1890.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

To the Acting Secretary to Government,
Public Works Department.

Order—dated 3rd July 1890, No. 368 I., Public Works.

Ordered that in accordance with the recommendations made in the note by the Chief Engineer for Irrigation the following letter be sent to the Secretary of State for India.

(Here enter No. $\frac{368\text{ I.,}}{11}$ dated 3rd July 1890.)

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
„ Chief Engineer, Periyár Project.
„ Superintending Engineer, V Circle.
„ Examiner, Public Works Accounts.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS:

Dated July, 3rd.

Recd. *Encl.*

G.O., 3rd July 1890, No. 368 I.

JULY.

Turbine

Ordered that the Secretary of State be addressed for a more powerful and better — than the one previously supplied being sent for driving the air-compressors of the Periyár tunnelling machinery.

PUBLIC WORKS DEPARTMENT.

Letter—to

The Right Honorable the SECRETARY of STATE for INDIA.

My Lord,

In forwarding herewith a copy of Proceedings of the Madras Government, No. 368 I., dated 3rd July 1890, we have the honor to request that your Lordship will be pleased to arrange for the despatch at as early a date as possible of a turbine which will fulfil the conditions of the specification for the tunnelling machinery for the Periyár works on which Messrs. Schram and Company's tender was made and accepted.

2. The fixing of the pecuniary responsibility for the faulty turbine which was supplied we must leave to your Lordship, but we would strongly urge that the despatch of the new turbine may not thereby be delayed.

We have the honor to be,
My Lord,
Your Lordship's most obedient, humble servants,

(Signed) CONNEMARA.
(„) C. G. ARBUTHNOT.
(„) J. H. GARSTIN.

(True Copy.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

Ootacamund,
3rd July 1890.

Govt. of Madras.

PUBLIC WORKS DEPARTMENT.

(Copy.)

Letter to the Right Honorable the Secretary of State for India.

No. $\frac{11}{368\ I.}$, dated 3rd July 1890.

Requesting to send a more powerful and better turbine than the one previously sent being supplied for driving the air-compressors of the Periyár tunnelling machinery.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper:—

From Colonel H. SMALLEY, R.E., Superintending Engineer, III Circle, to the Chief Engineer for Irrigation, Tank Restoration Scheme, dated Bellary, 19th June 1890, No. 784.

	RS.
Establishment	300
Investigation	282
Total ...	582

I have the honor to request that you will be so good as to obtain sanction and transfer the marginally-noted grants provided for the No. VI Party, Tank Restoration Scheme, in the final issue of the Irrigation budget of the current year, shown against the Cuddapah division, to the Bellary division, as the salary and travelling allowance, &c., connected with that party were paid by the latter division.

ORDER—dated 3rd July 1890, No. 370 I., Public Works.

The following transfer of funds is sanctioned:—

Provincial.
43. Minor Works and Navigation.
Works for which neither Capital nor Revenue Accounts are kept.
Tank Restoration Works.
Investigation.

From	RS.	*To*	RS.
Cuddapah Division.		Bellary Division.	
Works	282	Works	282
Special establishment	300	Special establishment	300
Total ...	582	Total ..	582

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, III Circle.
„ Examiner, Public Works Accounts.
„ Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 3rd.

Recd. *Encl.*

G.O., 3rd July 1890, No. 370 I.

JULY.

Funds

Sanctioning certain transfer of —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following paper :—

Notes of inspection of works at Periyár and Thekady to 10th June 1890 by the Executive Engineer, No. I Periyár Division.

Main dam.—More work has been going on here than was expected. The masonry wall in continuation of the weir commencing from the workshop wall has been extended and built up solid to + 15·00 to where it will be joined by the rear face of the dam, and on this eight piers up to 20, with eight vents each of 6-feet breadth, have been built. The first vent being 18 feet from the workshop wall makes a total length of 114 feet. At the end of this wall excavation has been carried down to about + 3·00, and it is found that the solid rock slopes downwards in both directions. This being the case, orders have been given to discontinue the masonry for the present, and to go on cutting away the earth to find how the rock actually goes. This excavation is cut off from the bye-wash by a bit of solid bank, so that work can go on here after the river rises. One new pier of 5-feet thickness has been built in the line of the front face of the dam, making four piers in all. Excavation for the fifth is in progress and a good deal of earth has been cut away in continuation of this line. It is found now that the semi-circular shutters have been made 16-feet diameter instead of 14 feet. The distance between the piers are as shown in the sketch. Orders have been given to make all piers in this line 5 feet thick and 13 feet apart or 18 feet from centre to centre. A third pier of 4 feet thickness has been built in continuation of the second row. These are required to form a bridge to pass the engine across to the pumping platform. A line of rails has been laid as shown in the sketch from which the spoil is delivered at one end into the mouth of the bye-wash, and at the other into the basin above the front wall.

> Approved. It is not probable that the depression will continue far in either direction. Local faults of this kind must be expected.

> I do not know how this mistake occurred ; they were certainly intended to be 14 feet ; the error is of no practical importance, the increased width being, if anything, rather an advantage.

Main workshop.—Seven out of the eight trusses have been put into position. Men are at work here now, and it will not take long to put the stiffeners and the sheets on. Some of the heavy pieces of machinery still remain to be brought to site. Three stone crushers are on the road ; a disintegrator and a mixer are still at Thekady. The bow section of the launch is at the Muliyapanjan, the other two at Thekady. The boiler has just been brought up to there. Three wire rope coils still remain at the foot of the ghât. The forwarding agent had one elephant at work, and expects another to haul these up. Mr. Jacob was expected on the 15th with two elephants and if they have come, all the rest of the machinery will soon have been transported to site. I am in treaty with another man for two more elephants, so that

> It is hoped that these will be brought over soon, as the road will be very heavy in July and August.

there will be four working on the project, by means of which timber will be hauled and work done, which would be very costly, if not impossible, to do by hand.

Buildings were under repair as far as possible, but the grass had not grown up enough to do much in the way of thatching yet.

This, which is due to the small amount of rain in May, is rather unfortunate, as it will delay the completion of necessary repairs. The grass, however, grows very rapidly when once it begins.

At Thekady there have been from 50 to 150 people at work and the medical returns show over 10 per cent. suffering from ague. The work done has been on the watershed cutting and the bye-wash. The latter will soon be completed and the former done as far as the bund when we can recommence work in earnest.

This is a bye-wash which has been found necessary, and was begun at the end of last season for keeping the flood water of the Muliyapanjan out of the cutting.

Lock No. I.—The water was just trickling over the sill, both gates being open. It is reported that there is a bad leak round the lower quoin when the chamber is full. This will be seen to.

The necessary instructions have been given; the leak is of no importance.

Lock No. 2.—Water just going over the sill of the vent in the weir. There is a leak through the bund into what was the lock chamber and the timber wing wall was bulging. This has been shored up and is believed to be quite safe.

Tunnel.—Hand-drilling has been going on steadily at the north end since the machinery was put away with satisfactory results; 104 feet length has been got out up to June 10th. The progress has been pretty regularly 12 feet during each period of ten days. During the last period, 1st to 10th June, 12 feet has been done with an expenditure of $49\frac{1}{2}$ lb. of gelatine or about $21\frac{1}{2}$ cubic feet to the lb. The cost of drilling for this period was about Rs. 300. The cost of removal of spoil had not been made out for this period. There was no water to work the fan turbine at the time of my visit, but the fan is all in place and has been worked satisfactorily while the water lasted.

This is very satisfactory, unexpectedly so as regards rate of progress and consumption of explosives, but there must be some mistake in the cost of drilling if the expression "this period" refers to 1st to 10th June; enquiry is being made about this.

Reports have been coming in of gelatine being stolen; one boy, the son of a carpenter, killed himself by exploding a cartridge at some place in Travancore. The explosives' accounts will be carefully examined.

Every effort should be made to guard against theft, but it is feared that it will be impossible to prevent it altogether.

The health at Periyár for the last month has been fairly good, the hospital returns showing a little over 6 per cent. of ague cases, resulting from the climate, in a population of from 300 to 350. The rain has just begun and there is nothing to prevent the establishments returning except that the houses are not yet ready. All require more are less re-thatching. This is being done as fast as possible, but the grass has not yet grown sufficiently to be used for thatch. I think that by the 1st July all will be ready for the return of the establishments. At Thekady it is still very unhealthy. There has been very little rain; there is no water, and the hospital returns show over 10 per cent. of fever cases, from climate causes, out of a population of about 150 and less. It will not be advisable to send Mr. Mathews back there until it is more healthy, but matters will doubtless soon improve now that the rains are setting in.

(Signed) H. S. TAYLOR,
Executive Engineer, No. I Periyár Division.

Submitted, with marginal notes, for the information of Government.

2. The report is satisfactory as showing that more labor is obtainable than was expected, and as the tendency will be towards a steady improvement in this respect, it is not impossible that in another year or two we may be able to work pretty regularly throughout the year at the Periyár.

3. Thekady will always be unhealthy in the dry weather from want of water.

4. Regular work will be resumed about the 1st July.

(Signed) J. PENNYCUICK, Colonel, R.E.,
Chief Engineer, Periyár Project.

No. 94 I.

Submitted to Government.

OOTACAMUND,
25th June 1890.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

ORDER—dated 4th July 1890, No. 371 I., Public Works.

Recorded.

2. Ordered that a copy of these Proceedings be forwarded to the Government of India for information.

(Here enter No. 372 I., dated 4th July 1890.)

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Chief Engineer, Periyár Project.
" Examiner, Public Works Accounts.
" Revenue Department.

ENDORSEMENT—dated 4th July 1890, No. 372 I., Public Works.

Forwarded.

(By Order.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 4th.

Recd. *Encl.*

G.O., 4th July 1890, Nos. 371 I., 372 I.

JULY.

Periyar Project Works

Forwarding the inspection notes of the — at Periyár and Thekady.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

Office note from the Examiner, Public Works Accounts, dated Madras, 21st June 1890, No. 3668.

In the divisional objectionable items' statement for February 1890 of No. II Periyár Division, the Chief Engineer, Periyár, asked my opinion as to whether, with reference to G.O., No. 125 W., of 16th January 1890 (one of the orders issued on the resolutions of the Government of India on the report of the Public Works Accounts Committee), it is necessary to notice in the divisional objectionable items' statement want of, or excess over, appropriations in cases of component works of a project. I then pointed out to him that under G.O., No. 35 W., dated 7th January 1890, no action should be taken on the Government orders communicating Government of India resolutions on the report of Accounts Committee until such orders are codified, unless *otherwise expressly stated.*

2. In reply, the Chief Engineer, Periyár, points out that the orders in G.O., No. 175 I., dated 15th March 1890, on the Provincial Objectionable Items' Statement. Irrigation Branch, for quarter ending 31st December 1889, viz., that the funds required for items reported for want of, or excess over, appropriations should be provided by the Chief Engineer, Periyár, by redistribution of grants for the Periyár project under G.O., No. 125 W., dated 16th January 1890, is in direct conflict with G.O., No. 35 W., dated 7th January 1890.

3. I beg that you will take such action as may be considered necessary to set this matter right. Proposals for action on the resolution of the Government of India regarding the recommendations of the Accounts Committee have been submitted for orders of Government in my office note to the Joint Secretary to Government, Public Works Department, No. 3329, dated 7th June 1890.

ORDER—dated 5th July 1890, No. 373 I., Public Works.

The official year 1889-90 having expired. no modifications of the allotments for that year can now be sanctioned. All expenditure of that year under the budget heads referred to in G.O., No. 125 W., dated 16th January 1890, incurred without, or in excess over, an appropriation duly sanctioned by Government will be entered in the Examiner's statements of objectionable items for the quarter ended on 31st March 1890. On receipt of these statements, the Examiner of Public Works Accounts will be authorised to admit the objectionable expenditure. With regard to modifications of the budget grants for the current year found necessary, Superintending Engineers

will, in conformity with G.O., No. 1645 W., dated 13th June 1890, apply as heretofore for the sanction of Government thereto, until the orders contained in G.O., No. 125 W., dated 16th January 1890, have been codified.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
To Superintending Engineers.
To the Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 5th.

Recd. *Encl.*

G.O., 5th July 1890, No. 373 I.

JULY.

Objectionable Expenditure

Orders regarding the adjustment of expenditure incurred without, or in excess over, an appropriation duly sanctioned by Government.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

No. 95 I.

Note by the Chief Engineer for Irrigation.

The accompanying statement which shows the incomplete works of last year and the demands made on the reserve of the current year, compiled from the statements received from Superintending Engineers, is submitted to Government with the following remarks.

IMPERIAL—42. MAJOR WORKS (WORKING EXPENSES).

2. *Items* 1 *to* 4.—As there is no reserve under this head, the sum of Rs. 3,122 required for items 1, 3 and 4 may be transferred from the current year's budget grant of Rs. 6,000 for minor works under "Extensions and Improvements" in the Tanjore division (budget item No. 17) and Rs. 998 required for item 2 from the grant of Rs. 8,000 for similar works in the Negapatam division (budget item No. 18).

3. *Item* 5.—The amount of Rs. 1,313 required for item 5 may be transferred from the grant of Rs. 10,000 for the Srívaikuntham anicut system under "Maintenance and Repairs."

4. *Item* 6.—The Superintending Engineer, I Circle, has applied for an allotment of Rs. 9,000 for the Godávari Eastern division under "*Maintenance and Repairs*" in addition to the budget grant of Rs. 75,500 to admit of the completion of the diversion of the Bank canal below Maskapalli lock. There are no funds available at present to meet this demand. The work should be carried out from the existing grant of the division. If any portion of the grant for the Godávari Western division can be spared it may be transferred to the Eastern division. If not, the Superintending Engineer should submit later on in the year an application for such additional allotment as may be absolutely required.

PROVINCIAL—43. MINOR WORKS AND NAVIGATION.

Irrigation and Navigation Works for which Capital and Revenue Accounts are kept.
Capital Account.

5. *Items* 7 *to* 13.—There is no reserve available under this head, but the amounts required for items 7 to 10 in connection with the Pálár anicut system aggregating Rs. 5,393 and those required for items 11 to 13 of the Pelandorai anicut system aggregating Rs. 3,343, or with establishment charges Rs. 6,633 and Rs. 3,861 respectively, may be provided by transfer from the grant for "Irrigation and Navigation Works for which neither Capital nor Revenue Accounts are kept—Ordinary works" as shown below :—

	RS.
From reserve under—	
Original works	8,429
Establishment	1,939
Tools and plant	126
Total ...	10,494

Irrigation and Navigation Works for which Capital and Revenue Accounts are kept.
Revenue Account.

6. Under this head also there is no reserve. The amounts required for items 14 to 25 aggregate Rs. 29,594 or Rs. 36,400 including establishment charges as shown below:—

——	Extensions and Improvements.	Maintenance and Repairs.	Establishment	Total.
	RS.	RS.	RS.	RS.
Pálár anicut system	6,822	10,958	4,089	21,869
Pelandorai anicut system	1,000	1,826	650	3,476
Chembrambaukam tank	775	504	294	1,573
Madras Water-supply and Irrigation Extension project	2,442	...	562	3,004
Chilka Lake canal	...	5,267	1,211	6,478
Total ...	11,039	18,555	6,806	36,400

The amount for the Pálár anicut system is required for completing improvements to the Káváripák tank and for repairing several tanks damaged during the cyclone of 1888. The amount for the Chilka Lake canal is required for clearing silt, for which an estimate, amounting to Rs. 6,500, was sanctioned in G.O., No. 28 I., dated 16th January 1890, the allotment sanctioned last year not having been fully utilized. The total amount of Rs. 36,400 required under this head may be transferred from the grant for "Irrigation and Navigation Works for which neither Capital nor Revenue Accounts are kept—Ordinary works" as shown below:—

	RS.
From reserve under—	
Original works	10,682
Repairs	18,555
Total ...	29,237
Establishment	6,725
Tools and plant ... ... —	438
Total ...	36,400

Irrigation and Navigation Works for which neither Capital nor Revenue Accounts are kept.

7. *Ordinary Works: Original Works—Items 26 to 54.*—The amounts provided for items 26, 40, 41 and 42 in the final issue of the budget estimates appended to G.O., No. 263 I., dated 2nd May 1890, aggregate Rs. 13,348 or Rs. 981 more than is now required to complete the works. The Superintending Engineer, II Circle, has reported that he can spare Rs. 15,000 from the grant for minor original works in the Nellore division. The total of surrenders is therefore Rs. 15,981 which can be appropriated towards meeting the demands. The amount applied for for item No. 44 need not now be allotted as the estimate for the work has not yet been sanctioned. The additional amount applied for for item No. 48 has already been provided in the final issue of the budget estimate—*vide* budget item No. 28. The provision for item No. 49 in the preliminary budget having in the final issue been increased from Rs. 1,400 to Rs. 2,027, the balance required for completing the work is only Rs. 173. This amount together with the demands for the remaining items under "Original works" aggregate Rs. 62,276 or Rs. 46,295 more than the surrenders. The latter sum may be provided from the reserve under *Original works* which will then be reduced to Rs. 814.

8. *Repairs.*—The Superintending Engineer, V Circle, has applied for an allotment of Rs. 5,000 for repairs in the North Arcot division in addition to the budget allotment of Rs. 50,000 as he considers that sum not sufficient. The amount applied for may be sanctioned from the reserve under *Repairs.*

TANK RESTORATION WORKS.

9. The demands under major original works for items 56 to 61 in the Coimbatore district aggregating Rs. 15,320 may be met by reducing the following grants :—

—	Existing grant.	Reduced grant.	Amount of reduction.
Coimbatore District.	RS.	RS.	RS.
" Minor original works "	5,000	2,000	3,000
Repairs	10,000	6,000	4,000
Bellary Division.			
Repairs	20,000	11,680	8,320
Total ...	...	...	15,320

The demands for items 62 to 64. Major Original Works, Madura division, amount to Rs. 8,439, and may be met by transfer from the grant of Rs. 27,000 for Minor Original Works in the same division.

AGRICULTURAL WORKS.

Original Works.

10. The demands for original works both major and minor, items 65 to 77, aggregate Rs. 44,582, while the reserve is only Rs. 2,200. Estimates have not yet been sanctioned for the following works for which Rs. 25,000 have been provided in the budget estimates in anticipation of sanction and that amount may be now reappropriated towards meeting the demand now being dealt with :—

	RS.
Godávari Eastern division—	
Godavari L.B., Purushottapatnam to Rajahmundry	10,000
Godávari Western division—	
Vasista-Godávari L.B. above Gunnaram aqueduct	5,000
Trichinopoly—	
Agunda Cauvery R.B. from Amarávati junction to Wyacondan head-sluice	10,000
Total ...	25,000

With the reserve the total sum available thus becomes Rs. 27,200. This sum may be appropriated to meet in full the demands for items 65, 66, 68, 69, 71, 72, 75, 76 and 77 and in part (as shown in the statement) the demands for items 70 and 73. There are no funds available to meet the demands for items 67 and 74.

Repairs.

11. *Item* 78.—The Superintending Engineer, I Circle, has applied for Rs. 8,000 for repairs under " River Conservancy " in the Godávari Eastern division in addition to the budget grant of Rs. 10,000 to admit of the protective works at Maskapalli for which an estimate of Rs. 11,000 was sanctioned in G.O., No. 254 I., dated 28th April 1890, being completed. The amount of Rs. 8,000 required, or Rs. 9,960 including "Establishment," and " Tools and Plant " charges, may be appropriated by transfer from

the grant for "Irrigation and Navigation Works for which neither Capital nor Revenue Accounts are kept" as shown below :—

	RS.
From reserve under—	8,000
Repairs	1,840
Establishment	120
Tools and plant	
Total ...	9,960

The balance of reserve under "Irrigation and Navigation Works for which neither Capital nor Revenue Accounts are kept—Repairs" will then be Rs. 35,445.*

		RS.	RS.
* Reserve as per budget			67,000
Appropriations—			
Para 6		18,555	
" 7		5,000	
" 10		8,000	
			31,555
	Total ...		35,445

12. *Item* 79.—The Superintending Engineer, I Circle, has also applied for an allotment of Rs. 13,000 for repairs to "River Embankments" in the Godávari Eastern division in addition to the budget grant of Rs. 8,000, the additional allotment being required for carrying out the diversion of the river bank below Maskapalli lock for which an estimate should have come in long ago, the Superintending Engineer promised to submit it "shortly." Until the estimate is sanctioned, no extra provision of funds need be made.

IMPERIAL—49. CAPITAL EXPENDITURE ON IRRIGATION WORKS NOT CHARGED AGAINST REVENUE.

13. *Item* 80.—The sum of Rs. 650 required for item 80 may be appropriated from the reserve of Rs. 4,545 under this head—*vide* budget item 25, page 10, of the Budget Estimate of Major Works.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

OOTACAMUND,
24th June 1890.

To the Acting Secretary to Government.
Public Works Department.

ENCLOSURE.

STATEMENT showing incomplete works of 1889-90 and the demands on the "Reserve" of 1890-91.

Circle.	Division.	Number of item.	Name of work.	Amount of estimate.	Number and date of Government Order sanctioning the estimate.	Expenditure to end of 1889-90.	Amount applied for.	Amount recommended (see "Note" of Chief Engineer for Irrigation) in P.M.G., No. 374 I., dated 7th July 1890.	Remarks.
1	2	3	4	5	6	7	8	9	10
			42. MAJOR WORKS (WORKING EXPENSES).	RS.		RS.	RS.	RS.	
			EXTENSIONS AND IMPROVEMENTS.						
			Cauvery Delta System.						
VI.	Tanjore	1	Kongan channel. Improvement ..	18,700	G.O., No. 511 I., dated 21st October 1889.	12,708	992	992	Required in addition to Rs. 5,000 allotted in the budget for completing the work.
	Negapatam ..	2	Devanadi dam across the Vettar—providing screw shutters.	8,500	G.O. No. 263 I., dated 2nd May 1888.	7,502	998	998	For completing the work.
	Tanjore	3	Cauvery left bank, mile 33—improving Vaduvagudi surplus weir.	4,600	G.O., No. 20 I., dated 9th January 1890.	..	2,000	2,000	This sum can be utilized this year if allotted. The work is necessary.
	Trichinopoly ..	4	Minor extensions and improvements ..	..	..	..	130	130	An estimate to this amount has been sanctioned.
			Total ..	..		..	4,120	4,120	
			Srivaikuntham Anicut System.						
VI.	Tinnevelly ..	5	Korampallem tank. Improving the — ..	2,740	G.O., No. 380 I., dated 2nd August 1889.	1,427	1,313	1,313	For completing the work.
			MAINTENANCE AND REPAIRS.						
			Godávari Delta System.						
I.	Godávari Eastern ..	6	Maintenance and repairs	..	..	..	9,000	..	This is in addition to Rs. 75,500 provided in the budget and is required for expenditure on diversion of Bank canal below Maskapalli lock.
			Total ..	..		..	14,433	5,433	
			43. MINOR WORKS AND NAVIGATION.						
			WORKS FOR WHICH CAPITAL AND REVENUE ACCOUNTS ARE KEPT.						
			CAPITAL ACCOUNT.						
			Pálár Anicut System.						
V.	North Arcot ..	7	Sakkiramallur channel, Esayanur large tank. Cutting a surplus channel in rear of north weir.	1,340	Sanctioned by Superintending Engineer.	..	340	340	This sum is required in addition to Rs. 1,000 provided for in the budget.

Statement showing incomplete works of 1889-90 and the demands on the "Reserve" of 1890-91—*cont.*

Circle.	Division.	Number of item.	Name of work.	Amount of estimate.	Number and date of Government Order sanctioning the estimate.	Expenditure to end of 1889-90.	Amount applied for.	Amount recommended (see "Note" of Chief Engineer for Irrigation) in P.M.G., No. 374 I., dated 7th July 1890.	Remarks.
1	2	3	4	5	6	7	8	9	10
			WORKS FOR WHICH CAPITAL AND REVENUE ACCOUNTS ARE KEPT—*cont.*	RS.		RS.	RS.	RS.	
			CAPITAL ACCOUNT—*cont.*						
			Pálár Anicut System—cont.						
V.	North Arcot—*cont.*	8	Sakkiramullur tank. Constructing an under-tunnel under Sakkiramullur surplus channel at 1,039 feet below the head.	1,070	Sanctioned by Superintending Engineer.	..	275	275	Required in addition to Rs. 795 provided in the budget.
		9	Valuvanur spring channel. Banking ..	420	Do. do. ..	..	420	420	
	Chingleput ..	10	Tirupakuli tank. Providing new stone revetment and constructing a weir.	4,358	G.O., No. 342 I., dated 31st March 1885.	..	4,358	4,358	
			Total, Pálár Anicut System ..	..		..	5,393	5,393	
			Pelandorai Anicut System.						
	South Arcot ..	11	Storage work, Konamangalam tank. Improvements.	19,560	G.O., No. 276 I., dated 16th May 1890.	17,627	1,933	1,933	
		12	Storage work, Sreeputhur tank ..	7,230	G.O., No. 596 I., dated 10th October 1888.	6,911	319	319	
		13	Compensation for land taken up for the system.	9,167	G.O., No. 626 I., dated 4th July 1884.	8,076	1,091	1,091	
			Total, Pelandorai Anicut System ..	..		..	3,343	3,343	
			Total, Capital Account ..	..		..	8,736	8,736	
			REVENUE ACCOUNT.						
			EXTENSIONS AND IMPROVEMENTS.						
			Pálár Anicut System.						
	North Arcot ..	14	Kávéripâk tank. Raising revetment ..	12,000	C.E., No. V-10 N.A., dated 19th February 1889.	7,913	4,087	4,087	Required for completing the work.
		15	Do. weirs. Providing shutters with screw gearing.	13,400	G.O., No. 471 I., dated 26th September 1889.	6,979	2,701	2,701	Required in addition to Rs. 3,720 provided in the budget.
	North Arcot ..	16	Minor work. Lump sum	..	....	..	34	34	Required in addition to Rs. 9,458 provided in the budget.

			Pelandorai Anicut System.						
	South Arcot ..	17	Minor works. Lump sum	..	....	..	1,000	1,000	In addition to Rs. 500 provided in the budget.
	Chingleput ..	18	Chembrambaukam tank system. Improvements.	14,210	G.O., No. 258 I., dated 28th May 1889.	13,511	699	699	Required in addition to Rs. 1,280 provided in the budget for 1890-91.
		19	Minor works. Lump sum	..	....	..	76	76	
			Madras Water-Supply and Irrigation Extension Project.						
		20	Minor works. Lump sum	..	....	..	2,442	2,442	
			Total ..	..	....	..	11,039	11,039	
			MAINTENANCE AND REPAIRS.						
I.	Ganjam	21	Clearing silt from the Chilka Lake canal ..	6,500	G.O., No. 28 I., dated 16th January 1890.	1,112	5,267	5,267	The last year's grant of Rs. 3,240 was not fully utilized.
			Pálár Anicut System.						
V.	North Arcot ..	22	Lump sum	..	....	..	5,000	5,000	Required in addition to Rs. 30,000 provided in the budget. There are tanks still unrepaired from the cyclone of 1888, which cannot be put in order unless more money be granted.
			Pelandorai Anicut System.						
	South Arcot ..	23	Lump sum	..	....	..	1,826	1,826	Required in addition to Rs. 10,174 provided in the budget.
			Pálár Anicut System.						
	Chingleput ..	24	Lump sum	..	....	..	5,958	5,958	Required in addition to Rs. 17,771 provided in the budget. The incomplete works of last year alone require Rs. 20,984 and estimates, amounting to Rs. 2,745, have been sanctioned and are still to be executed.
		25	Chembrambaukam tank system. Lump sum.	..	....	..	504	504	Required in addition to Rs. 4,496 provided in the budget.
			Total ..	..	....	..	18,555	18,555	
			WORKS FOR WHICH NEITHER CAPITAL NOR REVENUE ACCOUNTS ARE KEPT.						
			Original Works—Major.						
I.	Vizagapatam ..	26	Pulaparty channel head-sluice. Constructing—	5,210	G.O., No. 116 I., dated 4th March 1887.	3,376	624	..	The budget allotment of Rs. 2,210 is Rs. 376 more than required for completing the work.
		27	Pulaparty channel embankment. Reconstructing—	2,630	Superintending Engineer's No. 60, dated 5th April 1889.	629	2,001	2,001	
II.	Nellore	28	Vegur tank surplus weir	5,425	G.O., No. 394 I., dated 5th July 1888.	4,700	725	725	
		29	Anemadugu tank. Improvements ..	5,140	G.O., No. 510 I., dated 21st October 1889.	2,543	2,600	2,600	
		30	Chagole tank	10,550	G.O., No. 866 I., dated 10th December 1886.	9,878	675	675	
		31	Bramanakraku-Anamakondapalem tank. Improving—	5,090	G.O., No. 26 I., dated 14th January 1890.	26	5,000	5,000	
		32	Iswaravaka tank.	3,770	G.O., No. 89 I., dated 14th February 1890.	..	3,700	3,700	
		33	Yendalur tank. Improving— ..	5,250	Do. do.	..	5,000	5,000	

Statement showing incomplete works of 1889-90 and the demands on the "Reserve" of 1890-91—*cont.*

Circle.	Division.	Number of item.	Name of work.	Amount of estimate.	Number and date of Government Order sanctioning the estimate.	Expenditure to end of 1889-90.	Amount applied for.	Amount recommended (see "Note" of Chief Engineer for Irrigation) in P. M. G., No. 374 I., dated 7th July 1890.	Remarks.
1	2	3	4	5	6	7	8	9	10
			WORKS FOR WHICH NEITHER CAPITAL NOR REVENUE ACCOUNTS ARE KEPT.—*cont.*	RS.		RS.	RS.	RS.	
			Original Works—Major—cont.						
II.	Nellore—*cont* ..	34	Chennayapalem tank. Improving— ..	5,240	G.O., No. 165 I., dated 13th March 1890.	..	5,000	5,000	
		35	Marripalli Madugu tank	22,279	G.O., No. 58 I., dated 21st January 1888.	19,280	2,000	2,000	
IV.	Coimbatore ..	36	Resluicing the Thadapalli channel, No. 7, from 6 to 11 miles 2½ furlongs.	4,734	G.O., No. 46 I., dated 24th January 1890.	297	4,437	4,437	Required to complete the work.
		37	Amanilalavoo or Punchapalli tank and channel. Improving—	7,820	G.O., No. 610 I., dated 17th October 1888.	7,550	270	270	Do. do.
	West Coast ..	38	Constructing a rough-stone revetment to the western slope and repacking the face stone of the Enamakal dam.	4,940	G.O., No. 143 I., dated 11th October 1889.	..	3,000	3,000	
V.	North Arcot ..	39	Siruvanky tank. Improving—	8,470	G.O., No. 4 I., dated 6th January 1890.	4,261	4,209	4,209	Work in progress.
	South Arcot ..	40	Moongilput tank do.	4,160	G.O., No. 276 I., dated 7th June 1889.	2,168	1,992	..	The budget grant of Rs. 2,350 is Rs. 358 more than required.
		41	Vedur tank do.	15,790	G.O., No. 673 I., dated 8th November 1888.	9,517	6,273	..	The budget grant of Rs. 6,357 is Rs. 84 more than required.
V.	South Arcot ..	42	Kuthamkuppam tank. Improvements ..	4,430	G.O., No. 272 I., dated 6th June 1889.	2,162	2,268	..	The budget grant of Rs. 2,431 is Rs. 163 more than required.
		43	Vylamur large tank do. ..	4,820	G.O., No. 628 I., dated 17th December 1889.	20	1,800	1,800	Rs. 1,800 are required in addition to Rs. 3,000 provided in budget.
		44	Morattu channel	..	....	..	3,000	..	This sum has been applied for by the Executive Engineer and he reports that the estimate for the work is nearly ready.
II.	Tinnevelly ..	45	Panur channel and tank. Improving— ..	18,865	G.O., No. 423 I., dated 5th September 1889.	16,178	2,650	2,650	For completing the work.
		46	Kakanallur channel do. ..	17,205	G.O., No. 465 I., dated 19th May 1885.	15,311	1,000	1,000	Do. do.
		47	Perunkulam surplus channel, right bank, and road No. 23. Raising the—	7,805	G.O., No. 400 I., dated 10th July 1888.	1,398	2,200	2,200	Do. do.
		48	Marankulam and Papankulum tanks ..	5,460	G.O., No. 206 I., dated 28th March 1890.	2,000	1,760	..	The balance of the estimate has already been provided in the final issue of the budget estimate.

		49	Ilankulam tank and its supply channel ..	3,420	G.O., No. 204 I., dated 30th April 1889.	1,176	800	173	In addition to Rs. 2,027 allotted in the budget.
		50	Vasudavanallur-Periakulam tank ..	10,270	G.O., No. 399 I., dated 22nd August 1889.	1,248	2,000	2,000	In addition to Rs. 6,000 allotted in the budget
		51	Vadamalaikurichykulam	4,440	G.O., No. 565 I., dated 14th November 1889.	954	3,486	3,486	For completing the work.
V.	North Arcot ..	52	Minor original works. Lump sum ..	..	....	..	5,000	5,000	Required in addition to Rs. 15,000 provided in the budge—*vide* remarks against item 22.
VI.	Trichinopoly ..	53	Do. do.	..	....	..	3,350	3,350	Required in addition to Rs. 5,000 allotted in the budget as the sanctioned estimates on hand amount to Rs. 8,350.
	Tanjore	54	Do. do.	..	....	..	2,000	2,000	Required in addition to Rs. 1,000 provided in the budget as the sanctioned estimates on hand amount to Rs. 4,000.
V.	North Arcot ..	55	Repairs	..	....	..	5,000	5,000	Required in addition to Rs. 50,000 provided in the budget.
			Total ..	..		..	83,820	67,276	
			TANK RESTORATION SCHEME.						
IV.	Coimbatore ..	56	Kurchi anicut channel. Restoring and improving—	9,920	G.O., No. 583 I, dated 3rd October 1888.	6,124	3,796	3,796	Required to complete the work.
		57	Vambathy anicut channel and tank. Improving—	8,484	G.O., No. 164 I., dated 25th March 1889.	7,050	1,434	1,434	Do. do.
		58	Gettisamudram tank. Improvements ..	4,017	Register No. 12 T. of 1889-90.	2,612	1,405	1,405	Do. do.
		59	Authiyore tank. Repairs and improvements	6,326	Do. No. 26 T. of 1889-90.	3,016	3,310	3,310	Do. do.
		60	Areapuram channel. Restoring the anicut, constructing regulators and providing pot sluices to—	2,675	Do. No. 79 T. of 1889-90.	..	2,675	2,675	Do. do.
		61	Papankarai tank and channel. Constructing a head-sluice, an irrigation sluice and improving the escapes of the—	2,700	Do. No. 81 T. of 1889-90.	..	2,700	2,700	Do. do.
VI.	Madura	62	No. 4 Athur anicut channel and tanks. Improving the—	23,188	G.O. No. 423 I., dated 19th July 1888.	14,850	1,338	1,338	In addition to Rs. 7,000 provided in the budget estimate.
		63	No. 4 Thumbakulam tank and channel. Constructing 2 surplus weirs, sluices No. 2, &c.	5,460	Sanctioned by E I. in Register No. $\frac{276\ T.}{M.}$ of 1889-90.	646	4,814	4,814	For completing the work.
		64	Nos. 7 and 8, Perumalkulam tank and supply channel. Constructing a surplus weir and sluice No. 1, &c.	2,784	Sanctioned by E. I. in Register No. $\frac{309\ T.}{M.}$ of 1889-90.	497	2,287	2,287	Do. do.
			Total ..	..		..	23,759	23,759	
			AGRICULTURAL WORKS.						
			ORIGINAL WORKS—MAJOR.						
			River Conservancy.						
I.	Godávari Eastern ..	65	Surveying the Godávari river for the purposes of Act VI of 1884.	5,020	G.O., No. 224 I., dated 12th April 1890.	4,582	550	550	The Division officer says that the second revised estimate sanctioned in G.O., No. 224 I., dated 12th April 1890, is likely to be exceeded by about 2 per cent. Hence the application for more than the balance of the estimate.

Statement showing incomplete works of 1889-90 and the demands on the " Reserve " of 1890-91—*cont.*

Circle.	Division.	Number of item.	Name of work.	Amount of estimate.	Number and date of Government Order sanctioning the estimate.	Expenditure to end of 1889-90.	Amount applied for.	Amount recommended (see " Note" of Chief Engineer for Irrigation) in P. M. G., No. 374 I., dated 7th July 1890.	Remarks.
1	2	3	4	5	6	7	8	9	10
				R		RS.	RS.	RS.	
			AGRICULTURAL WORKS—*cont.*						
			ORIGINAL WORKS—MAJOR—*cont.*						
			River Conservancy—cont.						
IV.	Coimbatore ..	66	Constructing 7 cocoanut groynes a short distance below the head of the Nerur channel, Cauvery river right bank.	3,758	G.O., No. 624 I., dated 17th December 1889.	1,199	2,559	2,559	Required to complete the work.
VI.	Negapatam ..	67	Coraiyar straight cut between the Coraiyar head and the Railway bridge near Nidamangalam.	11,200	G.O., No. 241 I., dated 22nd April 1890.	..	5,000	..	It is necessary that the work should be put in hand soon.
			River Embankments.						
I.	Godávari Western..	68	Raising Vasista-Godávari left bank below Gunnaram aqueduct.	28,535	G.O., No. 349 I., deted 27th September 1877.	28,004	531	531	
		69	Fixing boundary stones in Godávari embankment.	2,700	G.O., No. 347 I., dated 1st April 1885.	2,047	653	653	
		70	Raising the right bank of Gowtami-Godavári from head up to junction of Bank canal with river bank.	17,300	G.O., No. 444 I., dated 13th September 1889.	34	12,266	5,000	In addition to Rs. 5,000 allotted in the budget.
II.	Nellore	71	Pennér river left bank flood embankment from Sangam to Moldevi embankment.	1,77,261	G.O., No. 448 I., dated 13th May 1885.	1,70,380	7,000	7,000	
V.	South Arcot ..	72	Malatar channel extension	9,600	G.O., No. 188 I., dated 10th April 1889.	5,295	2,024	2,024	In addition to Rs. 2,281 provided in the budget.
	Chingleput ..	73	Reconstructing a head-sluice on the Narayanaveram river embankment.	4,670	G.O., No. 355 I., dated 26th June 1890.	1,921	2,749	2,631	
VI.	Tanjore	74	Coleroon right bank from road No. 4 to Lower Coleroon anicut.	1,14,000	G.O., No. 881 I., dated 16th October 1885.	86,197	} 5,000	..	Required in addition to the sum of Rs. 10,000 allotted in the budget.
					Add compensation for land and earth adjustable in supplemental accounts for March 1890.	1,438			
						87,635			
			MINOR ORIGINAL WORKS.						
VI.	Negapatam ..	75	River conservancy	..	....	..	1,956	1,956	Required to complete the works in hand.
	Tanjore	76	River embankments	..	....	..	1,500	1,500	Required in addition to Rs. 500 allotted in the budget.

VI.	Negapatam ..	77	Do. do.	..	....	..	2,796	2,796	Required in addition to Rs. 1,000 allotted in the budget.
			Total, Original Works ..	..	....	..	44,582	27,200	
			REPAIRS.						
I.	Godávari Eastern ..	78	River conservancy	..	....	..	8,000	8,000	This is in addition to Rs. 10,000 provided in the budget for 1890-91, and is required for completing the stone protective works at Markapalli, for which an estimate of Rs. 11,000 has been sanctioned in G.O., No. 254 I. of 28th April 1890.
		79	River embankments	..	....	..	13,000	..	This is in addition to Rs. 8,000 given in the preliminary budget and is required for the diversion of the river bank below Maskapalli lock, for which an estimate will be submitted shortly.
			Total ..	..	....	..	65,584	35,200	
			49. CAPITAL EXPENDITURE ON PUBLIC WORKS NOT CHARGED AGAINST REVENUE.						
I.	Godávari Western ..	80	Fixing articulated pipe to take water from Annayyakodu irrigation channel extension across Addala creek.	8,690	Chief Engineer's memorandum No. I/166 G.D. of 21st December 1889.	8,476	650	650	The Division officer says that a revised estimate will be sent. Hence the application for Rs. 650.
			Total ..	..	....	..	650	650	

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

ORDER—dated 7th July 1890, No. 374 I., Public Works.

The appropriations and transfers of funds proposed in the foregoing note by the Chief Engineer for Irrigation are sanctioned.

2. The particular attention of the Superintending Engineers of the I, II, III, IV, V and VI Circles is drawn to the reductions of grants made in paras. 7, 8 and 9, which do not appear in the "Statement."

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
To Superintending Engineers.
To the Examiner, Public Works Accounts.
,, Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 7th.

Recd. *Encl.*

G.O., 7th July 1890, No. 374 I.

JULY.

Funds

Certain appropriations and transfers of —, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following paper :—

Proceedings of the Board of Revenue (Land Revenue), dated 9th June 1890, Mis. No. 3596.

THE HON. J. GROSE.

Read—the following letter from J. STURROCK, Esq., Collector of Coimbatore, to the Secretary to Government, Revenue Department (through the Secretary to the Commissioners of Land Revenue), dated Coimbatore, 27th May 1890, Reference on No. 587-Sub. :—

An application has been received from the Executive Engineer, Coimbatore Division, for 50 cents of survey No. 30 belonging to Rangareddi and Lingareddi in the village of Puthur Pallapalaiyam in the Erode taluk for the purpose of extending the east weir of the Puthur Pallapalaiyam tank in that village as per plan enclosed (to be kindly returned).

2. The owners of the field do not consent to part with the portion required by the Public Works Department on the ground that the land which is a garden is a valuable one and that they have no other means of maintenance than their land. An English translation of the statement containing the grounds of their objections is enclosed.

3. As it is really necessary to take up the land, it must be acquired under the Act, and I have therefore the honor to forward herewith a notification for publication in the *Fort St. George Gazette*, and to request that the Sub-Collector may be given the power of a Collector under the Act.

Resolution—dated 9th June 1890, Mis. No. 3596.

Submitted to Government for approval and publication.

(A true Copy and Extract.)

(Signed) A. G. CARDEW,
Acting Secretary.

No. 3845, Revenue.

Transferred to the Public Works Department (Irrigation Branch).

OOTACAMUND,
21st June 1890.

(Signed) C. A. GALTON,
Secretary to Government.

ORDER—dated 7th July 1890, No. 375 I., Public Works.

Ordered that the notification be published in the *Fort St. George Gazette.*

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Superintending Engineer, IV Circle.
" Revenue Department, with two enclosures.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 7th.

Recd. *Encl.*

G.O., 7th July 1890, No. 375 I.

JULY.

Land

Ordered that the notification for the acquisition of — for extending the weir of the Puthur Pallapalaiyam tank, in Erode taluk, Coimbatore district, be published in the *Fort St. George Gazette*.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following paper :—

From Lieut.-Colonel A. C. SMITH, R.E., Superintending Engineer, VI Circle, to the Chief Engineer for Irrigation, dated Kodaikánal, 18th June 1890, No. 281 T.N.

Under para. 1339 of the Public Works Code, I have the honor to request the sanction of Government, for carrying out by this department, the construction of a supply sluice to Tamaraikulam tank, a minor irrigation work in Nángunéri taluk, Tinnevelly division.

2. The tank is supplied by a sluice whose sill is at level + 16·30 in the right bank of the Vizianarayanam channel, and it does not receive proper supply as the bed of the tank is at a higher level (*i.e.*) 16·79. It is therefore proposed to construct a new sluice at a separate place higher up the channel so that the tank may draw its supply freely.

3. The estimate, amounting to Rs. 279, has been prepared at the request of the Revenue Department, who have collected from the ryots a contribution of one-third of the estimated cost, * including the prescribed centage for Public Works supervision and tools and plant. The Revenue Department have also requested to have the work carried out by this department intimating that application was made to the Board of Revenue to place at the disposal of this department the remaining two-thirds of the estimated cost, viz., Rs. 186, from the grant for minor irrigation works.

	RS.	A.	P.
* For works	93	0	0
Public Works supervision and tools and plant	22	12	7
Total ...	115	12	7

ORDER—dated 8th July 1890, No. 378 I., Public Works.

The execution of the work by the Public Works Department is sanctioned.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Superintending Engineer, VI Circle.
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 8th.

Recd. *Encl.*

G.O., 8th July 1890, No. 378 I.

JULY.

Tamaraikulam Tank

The construction of a supply sluice to —, in Nánganéri taluk, Tinnevelly division, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

From Lieut.-Colonel A. C. SMITH, R.E., Superintending Engineer, VI Circle, to the Chief Engineer for Irrigation, dated Kodaikánal, 23rd June 1890, No. 312 T. C.

With reference to your No. VI/19 T. N. of the 23rd May 1890, I have the honor to inform you that I do not think it advisable to transfer or reappropriate any portion of the grants for the two * works to Minor Extensions and Improvements under the Srívaikuntham anicut system at this early period of the year.

* Item 19 in page 10, budget estimate for major works, viz., cutting channels in the Korampallem tank, &c., grant Rs. 3,657.
Item No. 20 in page 10, budget estimate for major works, viz., constructing sluice in the Támbraparni river right flood bank, &c., grant Rs. 3,440.

2. In the budget a special grant of Rs. 10,000 is sanctioned under Maintenance and Repairs for repairs to sluices in the Peruvalai channel under Cauvery delta system in the Trichinopoly division; there appears very little chance of the whole of this sum being utilised in the current year. Since the submission of the current year's budget from this office in October last, Mr. Larminie, the Executive Engineer, has thoroughly inspected the channel and found unnecessary several of the works originally proposed; but his revised proposal is not likely to be ready for some time.

3. I consider that at least a portion of the above sum of Rs. 10,000 may very well be utilised elsewhere, and propose therefore the following transfers therefrom :—

TINNEVELLY DIVISION.

Sriraikuntham Anicut System.

42. Major Works (Working Expenses).

	RS.
(1) Minor Extensions and Improvements	3,000

TANJORE DIVISION.

Cauvery Delta System.

42. Major Works (Working Expenses).

(2) Minor Extensions and Improvements	4,000
Total ...	7,000

4. Estimates to the full extent of Rs. 3,000 now applied for have been already sanctioned for the Tinnevelly division, and the sum can be spent without difficulty.

5. From the grant of Rs. 6,000 for the Tanjore division, Rs. 5,155 have been already spent, as may be seen from the progress report for May, leaving only

Rs. 845 to meet the demands for the remainder of year under the head Minor Extensions and Improvements. The additional grant now applied for is not even one-fourth of the sanctioned estimates remaining to be worked. There are also some works for which contributions have been made by the interested mirasidars ; it is not advisable to defer the execution of these works for want of the portion of the cost to be borne by Government.

6. I request early orders on the above proposals.

Order—dated 8th July 1890, No. 379 I., Public Works.

The following transfers of funds are sanctioned :—

42. Major Works (Working Expenses).

From	RS.	*To*	RS.
Trichinopoly Division. Cauvery Delta System. Maintenance and Repairs.		Tanjore Division. Cauvery Delta System.	
Special Repairs—		Minor Extensions and Improvements.	4,000
Repairing sluice in the Peruvali channel	4,000		
		Tinnevelly Division. Srívaikuntham Anicut System.	
Repairing sluice in the Peruvali channel	3,000	Minor Extensions and Improvements.	3,000
Establishment	690	Establishment	690
Total ...	3,690	Total ...	3,690

2. Ordered that a copy of these Proceedings be forwarded for the information of the Government of India.

(Here enter No. 380 I., dated 8th July 1890.)

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
,, Superintending Engineer, VI Circle.
,, Examiner, Public Works Accounts.
,, Revenue Department.

Endorsement—dated 8th July 1890, No. 380 I., Public Works.

Forwarded.

(By Order.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 8th.

Recd. *Encl.*

G.O., 8th July 1890, Nos. 379 I., 380 I.

JULY.

Transfers of Funds

Forwarding copy of Proceedings sanctioning certain —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following papers :—

From C. VINCENT, Esq., Under-Secretary to the Government of India, Public Works Department (Civil Works—Irrigation), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 6th June 1890, No. 88 I.

I am directed to invite your attention to Public Works Department letter No. 24 I., dated the 11th February 1890, asking for copies of the monthly reports of progress of Periyár works, and to request that arrangements may be made for their punctual submission to the Government of India.

2. I am also to invite attention to para. 4 of this office letter No. 1 I., dated the 4th January 1890, and to inquire when the Government of India may expect to receive the information required on the several points referred to in paras. 12, 13, 14, and 15 of the Inspection Note by the Honorable Sir Charles Elliott forwarded therewith.

Office note from the Secretary to Government, Public Works Department, to the Secretary to Government, Revenue Department, dated Ootacamund, 19th June 1890, No. 312 D.

Has any information been yet received of when the Board of Revenue is likely to furnish the information required by the Government of India in para. 4 of its letter No. 1 I., dated 4th January 1890 (see para. 2 of G.O., No 49 I., dated 24th January 1890, herewith*)? I think you intended on 17th to send a telegram to the Board on the subject.

* Please return.

G.O., dated 24th June 1890, No. 3890, Revenue.

Read—the following Proceedings of the Board of Revenue (Land Revenue), dated 21st June 1890, Mis. No. 3955, on telegram from Government, Revenue Department, dated 17th June 1890.

Resolution—dated 21st June 1890, Mis. No. 3955.

Communicated to the Collector of Madura who will submit without delay the report called for in Board's Proceedings, dated 21st February last, No. 1166, and will report at once when it may be expected.

2. The following telegram will be sent to Government :—

"Your telegram 17th regarding Elliott's note Periyár. Report called for from Madura Collector not yet received. Reminder sent. Probable date of receipt will be reported."

Read—also telegram from the Board of Revenue (Land Revenue), dated 22nd June 1890, stating when they will report regarding the disposal of waste lands under Periyár project.

Order—dated 24th June 1890, No. 3890, Revenue.

Communicated to the Public Works Department with reference to office note No. 312 D., dated 19th June 1890, from that department.

2. It is observed that there was a delay of 4 days in communicating the urgent telegram from Government to the Collector of Madura.

(True Extract.)

(Signed) C. A. GALTON,
Secretary to Government.

No. 97 I.

Note by the Chief Engineer for Irrigation.

Copies of all the reports of progress on the Periyár works received since receipt of letter No. 1 I., dated 4th January 1890, from the Government of India, have been forwarded with endorsement No. 302 I., dated 23rd May 1890, and with that was also sent a statement showing the expenditure during the past official year.

2. In future copies of the progress report showing the expenditure in each month, form No. M 102, shall be forwarded as soon as received, and copies of the Proceedings of the Madras Government in which the reports of progress written by the Chief Engineer in charge of the works are embodied shall be sent regularly as soon as issued.

3. The information referred to in para. 2 of the letter from the Government of India has to be furnished by the Revenue Department as ordered in para. 2 of G.O., No. 49 I., dated 24th January 1890.

OOTACAMUND,
25th June 1880.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

To the Acting Secretary to Government,
Public Works Department.

ORDER—dated 9th July 1890, No. 381 I., Public Works.

Ordered that the following letter be sent to the Government of India.

(Here enter No. 382 I., dated 9th July 1890.)

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Chief Engineer, Periyár Project.
" Revenue Department.
" Examiner, Public Works Accounts.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 9th.

Recd. *Encl.*

G.O., 9th July 1890, No. 381 I.

JULY.

Progress Reports, Periyar Project

Orders on letter from the Government of India regarding the punctual submission of the monthly —.

PUBLIC WORKS DEPARTMENT.

Irrigation.

LETTER—from

G. T. WALCH, Esq.,
Acting Secretary to the Government of Madras,
Public Works Department,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
PUBLIC WORKS DEPARTMENT.

SIR,

I am directed to acknoweldge the receipt of your letter No. 88 I., dated 6th June 1890, and with reference to its para. 1 to say that the course indicated in the note by the Chief Engineer for Irrigation, herewith forwarded, which it is believed will meet the requirements of the Government of India, shall be followed.

2. With reference to para. 2 of your letter under reply, I am to say that the matter is under consideration by the Board of Revenue, which will, it is expected, soon furnish the necessary information.

I have the honor to be,
Sir,
Your most obedient servant,

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

FORT ST. GEORGE,
9th July 1890.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 9th.

Recd. *Encl.*

9th July 1890, No. 382 I.

JULY.

Progress Reports, Periyar Project

Regarding the punctual submission of the monthly —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

From the Right Honorable the Secretary of State for India, to His Excellency the Right Honorable the Governor in Council of Fort St. George, dated India Office, London, 15th May 1890, No. 9, Public (Records).

Referring to your Excellency's letters in the Public Works Department, No. $\frac{17}{515}$ I. of the 22nd October 1889, and No. $\frac{1}{40}$ I. of the 21st January last, I enclose a copy of a letter from Lieutenant-General J. Mullins, R.E., of the 19th April, together with a copy of Messrs. E. and F. N. Spon's account for printing and publishing General Mullins' "Manual of Irrigation," and the bill of lading for the 425 copies which have been shipped to your Government.

2. In addition to the distribution of this work authorized by your Excellency General Mullins has been instructed to send five copies for the use of this office.

ENCLOSURES.

From Lieut.-General J. MULLINS, R E., to the Under-Secretary of State for India, dated Uphill, Guildford, 19th April 1890.

With reference to the order of the Madras Government, dated 22nd October 1889, No. 515 I., Public Works, I have the honor to report that Messrs. E. and F. N. Spon have completed the publication of the Irrigation Manual therein referred to, and have disposed of the 500 copies ordered in accordance with the direction of the Madras Government, except that, as 5 copies had to be supplied to the British Museum free of charge, Messrs. E. and F. N. Spon have only 45 copies instead of 50 left in their hands for sale.

2. The 425 copies of the Manual which were directed to be sent to Madras have been shipped (10 in cases) in the "Golconda," and I have sent one copy of the bill of lading to the Secretary to Government, Public Works Department, Madras, a second copy will be forwarded by the next mail, and the third copy is enclosed. This consignment has been insured for £ 600, and I have asked the publishers to send me the Policy of Insurance for transmission to you.

3. Messrs. E. and F. N. Spon have performed the duty entrusted to them in a very satisfactory manner, and in a time but little in excess of their original estimate. Instructions to begin the work were sent to them on the 12th November last. The first completed copy was forwarded to me for examination on the 20th March and the copies for Madras were sent to the docks for shipment on the 2nd April.

4. I enclose a copy of Messrs. E. and F. N. Spon's account. The items forming the first total are, as regards the first, fourth and fifth entries, in accordance with their estimate dated 9th September last. The other two entries are extra charges, the one of £ 5 for letterpress corrections, and the other of £ 15 for work done to the plates and diagrams, of which there are altogether 112, to secure clear photographs. The former was provided for under "corrections" and is very small in amount. The latter I did not take specially into account in my letter of the 19th September 1889 to the Chief Engineer for Irrigation, Madras, and indeed it was incapable of determination beforehand; but there is some provision under "margin for extra charges" available. I have made inquiry as to the particulars of this charge, and the publishers state that only draughtsman's labor actually employed on the necessary improvement of the drawings has been charged for; this amounted to 200 hours altogether. That some such work would be needed was indicated in the 7th paragraph of Messrs. E. and F. N. Spon's letter of the 9th September 1889. After the proof of some of the plates and diagrams had been received and examined, the publishers were informed, in reply to a reference made by them, that if an

expenditure of £ 5 or £ 6 on draughtsmen's labor would effect the improvement required, they might use their discretion in dealing with those drawings which were defective from the photographic point of view; but it was not considered necessary or desirable to undertake the improvement of the plates and diagrams generally. I am of opinion that, although the amount named by me has been exceeded, the instructions given have been adhered to as closely as possible.

This part of the account exceeds by £ 3-5-0 the amount * estimated by me as necessary and which, under the head of publication charges, I have been authorized by the Madras Government to pass.

* $\frac{350}{500} \times 530 + \frac{150}{500} \times 460 = 371 + 138 = 509.$

The remaining items are for packing, freight, &c., and insurance.

The full total of the account £ 528-4-5 is £ 21-15-7 less than the sum provided by the Madras Government.

5. The account received from Messrs. E. and F. N. Spon has been returned to them passed, to the extent of £ 524-19-5 for payment; but I have no hesitation in recommending that the additional £ 3-5-0 be paid to them.

Messrs E. and F. N. Spon's account, dated London, 2nd April 1890, for the publication of an Irrigation Manual for the Government of Madras, £ 528-4-5.

Messrs. E and F. N. Spon having completed the publication of this Manual, and having performed the duty entrusted to them in a thoroughly satisfactory manner, the undersigned has passed their account, in accordance with the authorization contained in the order of the Madras Government, dated 22nd October 1889, No. 515 I., Public Works, as follows :—

	£	s.	d.
Publication charges—			
Printing, &c., 500 copies	405	0	0
Binding 350 copies, half calf	75	5	0
Binding 150 copies, cloth	12	0	0
Publication extra charges—			
Corrections to letterpress ... / Sundry work to plates and diagrams }	16	15	0
	509	0	0
Packing, freight and insurance	15	19	5
Total ...	524	19	5

and he recommends that the difference of £ 3-5-0 between the above sum and the total of Messrs. E. and F. N. Spon's account as rendered, which is in excess of his powers of sanction, be admitted and paid to them.

(Signed) J. MULLINS, Lieut.-General.

19th April 1890.

ORDER—dated 10th July 1890, No. 383 I., Public Works.

Recorded, with reference to Proceedings No. 356 I., dated 27th June 1890, and despatch to the Secretary of State, No. $\frac{9}{356}$ I. of the same date.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 10th.

Recd. *Encl.*

G.O., 10th July 1890, No. 383 I.

JULY.

General Mullins' Manual of Irrigation

Despatch from the Secretary of State for India forwarding copy of letter from General Mullins and a copy of account of Messrs. E. and F. N. Spon's account for printing and publishing —, recorded.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper :—

From H. S. TAYLOR, Esq., Executive Engineer, No. I Periyár Division, to the Chief Engineer, Periyár Project, dated Kodaikánal, 23rd June 1890, No. 99 S.E.

I have the honor to forward herewith an estimate for Rs. 7,000, on account of repairs and carriage of tools and plant, for your approval and sanction.

No. 30 C./P.R.

Submitted to the Chief Engineer for Irrigation for sanction.

2. This estimate is intended to cover expenditure on repairs and carriage up to the end of the current official year.

Veerapaudy,
27th June 1890.

(Signed) J. PENNYCUICK, Col., R.E.,
Chief Engineer, Periyár Project.

Order—dated 11th July 1890, No. 384 I., Public Works.

The following estimate is sanctioned :—

Capital Expenditure not charged to Revenue,

the amount being met from the balance of the provision for tools and plant in the sanctioned estimates for the Periyár Project which will then be Rs. 49,848.

49. Irrigation.
Periyár Project.
III. Tools and Plant.
13. Repairs and Carriage.

	RS.
Repairs and carriage of tools and plant, estimate	7,000

2. This sanction has been registered as No. 33 I. of 1890-91.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Chief Engineer, Periyár Project, with one estimate.
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.
ACCOUNT.

Govt.. of {1890} Madras.

PUBLIC WORKS:

Dated July, 11*th*.

Recd. *Encl.*

G.O., 11th July 1890, No. 384 I.

JULY.

Tools and Plant, Periyar Project

Estimate of Rs. 7,000 for the repair and carriage of —, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following paper :—

Letter from the Resident in Mysore, dated 24th June 1890, No. 1930-22890.

ORDER—dated 12th July 1890, No. 387 I., Public Works.

Ordered that the Resident be addressed in the Political Department.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
,, Political Department, with draft letter.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 12th.

Recd. *Encl.*

G.O., 12th July 1890, No. 387 I.

JULY.

Tanks

Ordered that the Resident of Mysore be addressed in the Political Department on the subject of the proposed improvements to two tanks in the Chitaldroog district.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Read—the following paper :—

Proceedings of the Board of Revenue (Revenue Settlement, Land Records and Agriculture), dated 16th June 1890, Mis. No. 2460.

Mr. Clogstoun.

Read—the following letter from the Collector of Ganjam, dated 17th May 1890, No. 3540 :—

The Chairman of the Berhampore Municipality wrote to Mr. Horsfall to say that the source of water-supply to the Ramalingum tank in Berhampore having been on several occasions strongly condemned by medical authorities, the Berhampore Municipal Council were anxious to have a pure source of water-supply for this important tank situated as it is in a central position between Bhapur and Berhampore ; that a hill stream called Bahana nullah that comes from the Kerandy Maliah hills flows through the lands of the villages of Lanja, Dakshinapuram, Senkarapuram, Jagadalapuram, Nimmakhandy, Bhapur, Luchapada and Bhavinipuram and crosses the Berhampore-Chatrapur road at Khodasingi in its onward course to the Tampara at Gowzu ; that it is arrested by a masonry sluice at Ambugada, and the surplus water diverted to the large irrigation tank of the village ; that the surplus water of this tank (Ambugada tank) is, by a similar sluice, taken by a channel called Ambugada channel to the Mandia and Haridakhandi tanks and finally to the Dhoba tank which is the principal source of irrigation to the Senkarapuram lands ; that in the rainy season a great volume of water comes through this Ambugada channel, and after all the above tanks are filled up a great deal of surplus water escapes over the Senkarapuram fields into the main stream ; that it is this surplus water that the Council would wish to utilize for filling up the Thammayya and Ramalingum tanks by means of a small channel dug from a point near the inlet of the Dhoba tank through Senkarapuram fields lying to the north of the dispensary building, District Munsif's Court and Sub-Magistrate's office, and that this channel after crossing the Aska road near Tootikavany tank would pass through some lands of Bhavinipuram before entering the Thammayya and Ramalingum tanks ; and requested Mr. Horsfall to allow the water of the Ambugada channel to be diverted in the manner proposed.

2. A sketch showing the route through which the small channel in question passes and furnished by the Chairman is herein enclosed.

3. The Senior Assistant Collector to whom Mr. Horsfall referred the matter reported that there would be no objection to allowing the Municipality to take water from the Ambugada channel, as, in ordinary seasons, there would usually be more

water received in that source than could be utilized by all the lands under it; and Mr. Horsfall authorized the Chairman to commence the digging of the small channel in question in order to divert the water of Ambugada channel to Thammayya and Ramalingum tanks in anticipation of sanction of Board and Government.

4. I have therefore the honor to request that the Board will be pleased to obtain the sanction of Government for allowing the Municipality to utilize the surplus water of the Bahana nullah, a Government source of irrigation, for filling in the Thammayya and Ramalingum tanks.

	ACS.
Senkarapuram	1·71
Bhapur	0·65
Total ...	2·36

5. The extent of the lands taken up for the small channel is acres 2·36 as noted in the margin. The Chairman informs me that the owners of these lands do not claim exemption from sist.

Resolution—dated 16th June 1890, Mis. No. 2460.

Submitted for the favorable consideration and orders of Government.

2. The Board is of opinion that the surplus water of the Bahana nullah may be utilized as proposed by the Collector.

3. It is presumed that the digging of the proposed channel from a point near the inlet of the Dhoba tank does not interfere with the latter's usual supply.

(A true Copy and Extract.)

(Signed) J. LAKSHMIKANTA RAO,
Acting Secretary.

No. 4059, Revenue.

Transferred to the Public Works Department.

OOTACAMUND,
2nd July 1890.

(Signed) C. A. GALTON,
Secretary to Government.

No. 98 I.

Submitted to Government.

There are no objections as far as this department is concerned to the Berhampore Municipality utilizing in the way suggested the surplus water of the Bahana nullah.

2. It is understood that the supply to be taken to the Kota Tummiah and Ramalingum tanks in Berhampore is merely for domestic purposes, and that none of it will be passed out of those tanks for irrigation or to go to waste, for were this to be the case there would be objections on the grounds of possibly prejudicial effect on the supply of the following tanks which the Imperial list and map show to derive their supply from the Bahana nullah below Berhampore, viz. :—

67. Bodhoghoyi of Ankollo.
68. Kistnasagaram of Paskara.
69. Kotharaghayi tank of Gownjoo.
70. Gownjoo Tampara.

OOTACAMUND,
5th July 1890.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

To the Acting Secretary to Government,
Public Works Department.

ORDER—dated 14th July 1890, No. 388 I., Public Works.

Government sanctions the use by the Berhampore Municipality of the surplus water of the Bahana nullah for feeding the Kota Tummiah and Ramalingum tanks of Berhampore on the understanding stated in para. 2 of the endorsement of the Chief Engineer for Irrigation.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
,, Superintending Engineer, I Circle.
,, Revenue Department, with one sketch.
,, Local and Municipal Department.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 14th.

Recd. *Encl.*

G.O., 14th July 1890, No. 388 I.

JULY.

Bahana Nullah

The use by the Berhampore Municipality of the surplus water of the — for feeding the Kota Tummiah and Ramalingum tanks of Berhampore, sanctioned on certain conditions.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper :—

From Lieut.-Colonel S. C. CLARKE, R.E., Officiating Superintending Engineer, V Circle, to the Chief Engineer for Irrigation, dated Chepâk, 23rd April 1890, No. 401.

I have the honor to resubmit for sanction the estimate (with plans), amounting to Rs. 28,440, for improving the Pombay channel, which starts at the north end of the Ṭirukoilúr anicut, which has been duly revised with reference to your memorandum No. V/38 S.A. of 14th August 1889.

2. The Executive Engineer explains, with reference to your memorandum, para. 2 (*b*), that owing to the site of the new regulator being 465 feet distant from the proposed regulating weir, the connecting of the two works as you suggested could not be done except at very considerable expense. He has therefore only provided for separate (short length) revetments for each work.

3. Anent your para. 2 (*e*). The Executive Engineer reports that the right wing of the regulator will abut on high ground in continuation of a ridge of boulder rock, so that there is no probable danger of its flank being turned.

4. The Executive Engineer is of opinion that it will be advisable to provide for the full theoretical discharge of 4,815 cubic feet per second, due to a maximum flood from the entire catchment area, rather than trust to the possibility of the earth embankment being breached at the critical time or right moment, should the length of the weir be reduced on the score of economy, to dispose of only half the maximum discharge. He has therefore provided for 15 vents of 9 feet each, but leaves the question of reduction of weir for you to settle finally.

5. The surplus water during any ordinary flood, discharged over the several weirs, will flow into the natural water-courses or channels, and eventually fall into the river about half mile distant, but during any extraordinary flood season the adjoining lands will be submerged to a more or less extent which cannot very well be provided against at the present time, but this question might later on be considered should the necessity arise and call for attention.

Enclosure.

Report on Pombay Channel.

This channel taking off the Ponniár river at the Tirukoilúr anicut was excavated some eighteen years ago, but on account of insufficient provision for cross drainage works the banks have been constantly breached and the value of the channel thereby has been much diminished. At the anicut there is a head-sluice of 4 vents of 6′ × 5′ for the supply of the channel ; its entire

length to its junction with the Pombay river is 11 miles 5 furlongs and 514 feet. The bottom width was fixed at 30 feet with 2 feet fall per mile and 4½ feet depth of F.S. These dimensions it is proposed to retain. The channel bed, however, has much deteriorated and extensive clearing and removal of grass are required to restore it to its original state. At present there exist three drops, the first at 1st mile 1¼ furlong, the second at 2nd mile 1st furlong, and the third at 10th mile 4th furlong. It is proposed to build a terminal drop at 10th mile 6th furlong to prevent further scour of the bed near the junction with the Pombay river.

2. At 3rd mile 2nd furlong a very large drainage of some 36 square miles enters the channel and has been in the past the chief cause of damage. It is proposed to construct at this point another head-sluice across the channel and a regulating weir in the right bank of 15 vents of 9 feet, fitted with screw-gearing shutters to keep up the supply. By this means the F.S.L. and M.L. of water in the channel can be kept below the new head-sluice, at about 4½ feet above bed level. No inlet is required, nor in fact is a left bank required, as the natural slope of the country on this side is steep and towards the channel.

Regulator 5 spans of 6 feet allowed.

Fifteen vents of 9 feet now provided.

3. At 3 miles 7 furlongs, and above the Kodungal bridge, surplus of about half square mile enters, and at 4th mile below this there is a head-sluice for supplying Arkadu tank, which would carry away all the extra water, and thus an outlet is not required. From 4½ miles the channel receives by open cuts in the left bank the local drainage up to Arkadu bridge, a little beyond 5½ miles, and a saddle or ridge is crossed here. Below this bridge, at 5 miles 7 furlongs, joins the drainage of the left side of the ridge, just opposite the site of an old stone sluice since completely washed away and where a breach continually occurs. It is proposed to construct here an outlet 90 feet long with a vent 6″ × 6″ for the supply of Gúdalúr fields where a palmyrah sluice is now temporarily put in in closing the breach. At 6 miles 2 furlongs the surplus of Ayanthur tank enters, the drainage area intercepted here is 3·11 square miles. Just at this place also on the right bank is a palmyrah sluice for irrigation of Ayanthur fields, which, before the existence of this channel, used to be watered by the right "Kody" of Ayanthur tank. This is also a place where a breach occurs whenever the tank surplusses into the channel. Here an outlet 112 feet long is proposed with a vent 6″ × 6″ for irrigation of Ayanthur fields. After this point the channel receives the drainage of Ayanthur village, its wet and dry fields which joins above the Gúdalúr bridge, and just below the Gúdalúr bridge is a rough stone escape, put in temporarily by Major A. C. Smith, R.E., which in his report he said "may later on be with advantage built pucka." It is proposed to convert this rough stone escape into an *Ogee outlet* 44 feet long; at 8 miles 1 furlong there is another similar temporary rough stone escape, but 2 feet too high. In providing a pucka surplus weir 44 feet long here, opportunity is taken to put in a vent for a safer and better supply of Kalpattu tank in room of a *multum in parvo* sort of work further down. Passing an existing under-tunnel at 8 miles 5 furlongs 352 feet the channel is taken through a ridge with deep and heavy cuttings, and the drainage of the other side of the saddle enters this channel by a rough stone inlet, and further down by a masonry inlet, the latter just opposite the Mambalapattu sluice will supply the tanks of those two villages; no other outlet is considered necessary, as no other drainage enters the channel after this.

Revised. Clear overfall now allowed.

4. The following bridges exist in the channel and are in fair order, only slight repairs being required, for which lump sum provision is made:—

(1)	0 mile	5 furlongs	and 400	feet,	Arumbalay bridge.
(2)	2 miles	2	„	209	„	Kakakuppam bridge.
(3)	3 „	0	„	410	„	Verasolapuram bridge
(4)	3 „	7	„	390	„	Kodungal bridge.
(5)	5 „	4	„	495	„	Arkadu do.
(6)	7 „	3	„	540	„	Gúdalúr do.

5. The several sluices as detailed below are in fair working order though requiring slight repairs and raising as stated, for which lump sum provision has been made:—

(1) *Kilkondur sluice at 3 furlongs 225 feet.*—The floor is 2½ feet below the theoretical bed; the floor will be raised to the theoretical bed level for the passage of spring water; there is already an under-tunnel at 1 mile 3 furlongs and 266 feet. It was to pass this spring water that the floor was originally placed at so low a level.

(2) *Kakakuppam sluice at 1 mile 7 furlongs and 530 feet.*—The floor of this is 1·14 feet below theoretical bed level. It is proposed to raise it to that level.

(3) *Verasolapuram sluice No. I at 2 miles 6 furlongs and 358 feet.*—This requires some repair. The floor is nearly 2½ feet below the theoretical bed level and it is proposed to raise it to that level.

(4) *Verasolapuram sluice No. II at 3 miles 1 furlong and 180 feet.*—The floor of this is 3¾ feet below theoretical bed and is to be raised to that level.

(5) *Arkadu sluice at 4th mile.*—The floor is 0·57 feet below theoretical bed level and is to be raised to that level.

(6) *Mambalapattu sluice at 9 miles 4 furlongs and 235 feet.*—The floor is 3¼ feet below the theoretical bed, and is to be raised to that level.

(7) *Muilipattu sluice at 10 miles 1 furlong and 566 feet.*—The floor is 1·80 feet below the theoretical bed and is to be raised to that level and plastered.

6. The low level at which the floors of all these sluices were built has been the cause of great waste of water. By raising the floors to bed levels of channel more water will get into the Pombay river, where it is most wanted, and thence to the tanks in the Villupuram taluk under the channel.

7. The under-sluices across the channel for drainage supply are detailed below and are in fair working order, requiring only slight repairs, for which lump sum provision is made in the estimate :—

(1) *Kilakondur under-tunnel at 1 mile 3 furlongs and 266 feet.*—The top of this work is 1·09 feet above the theoretical bed and is proposed to leave it undisturbed except plastering, &c., here and there. This is to pass spring water from the river direct, for which a vent in Tirukoilúr anicut is provided.

(2) *Arkadu under-tunnel.*—This is at 4 miles 4 furlongs and 162 feet to pass down water from Arkadu sluice in the Pombay channel at 4th mile, the Arkadu channel running along the and nearly parallel to Pombay channel for about half a mile and then crosses the latter where the above under-tunnel is provided. The top of this under-tunnel is 1·87 feet below the theoretical bed; it is proposed to leave it undisturbed, except minor plastering, &c.

(3) *Ayanthur under-sluice No. 1 at 6 miles 4 furlongs and 410 feet.*—The top of this under-sluice is 1·20 feet below the theoretical bed; it will be left undisturbed. This is to pass Ayanthur tank sluice water for lands on the right of the Pombay channel. Slight repairs are required.

(4) *Ayanthur under-sluice No. 2*—is at 6 miles 6 furlongs, and its top is 0·94 feet below the theoretical bed of the channel. This is to pass Ayanthur tank sluice water for lands on the right of the Pombay channel. Repairs are required and will be done from the lump sum provision.

(5) *Ayanthur under-sluice No. 3 at 7 miles 1 furlong and 260 feet.*—This is blocked up at present and one end is covered with prickly-pear. It will be re-opened.

(6) *Kalpattu under-tunnel at 8 miles 5 furlongs and 352 feet.*—This is to pass the drainage of one square mile to Kalpattu tank. This has lately been repaired and foundations deepened. There is at present a vent to serve as supplying sluice for Kalpattu tank. There is no need of this vent now, as a vent in the outlet at 8 miles 1 furlong or a little more than half mile *above* it is allowed; minor plastering, &c., to be done, along with the closing of the upper vent. The top of the under-tunnel is 4·63 feet below the theoretical bed of channel and is to be left undisturbed.

(7) *Mullipattu under-sluice at 10 miles 4 furlongs and 418 feet*—and to pass the drainage of about half square mile to Mullipattu tank and is in fair order. The top is nearly 1·00 feet below the theoretical bed and is proposed to be left undisturbed.

8. The inlets in the channel on the left bank are three: (1) a pucka work at 3 miles and 217 feet above Verasolapuram to bring in partially the drainage of 36 square miles; this is not enough, but it is not proposed to meddle with it, as the open breach below the Verasolapuram bridge will bring into the channel all the rest of the surplus water; (2) a rough stone inlet at 9 miles 2 furlongs and 467 feet for taking in the drainage of about half square mile; it was originally 10 feet wide, but is now widened by a breach to 24 feet; it is proposed to widen the existing 10 feet to 24 feet with rough stone only; (3) a pucka inlet for drainage of quarter square mile at 9 miles 4 furlongs and 235 feet opposite Mambalapattu sluice in fair order.

9. The channel left bank all along is to be left untouched except at two places, the first at Ayanthur under-sluice where full supply in channel is likely to escape through the low ground at left edge of channel and then run out through the under-sluice which is intended for Ayanthur tank sluice waters to pass underneath the channel for wet fields right of the channel. The second place is at the Kalpattu under-tunnel, where any breach would drain away the supply of the channel through the under-sluice into Kalpattu tank unnecessarily, and no supply would go beyond that along the Pombay channel. At these two places therefore the bank is to be made to the same level as the right bank.

10. The proposed four outlets above referred to (para. 3) are to have South Indian Railway rails 2 feet above the crest, whose tops are to be at F.S.L. of the channel. The spaces between these South Indian Railway rails are to be temporarily bunded up by the conservancy lascars, who will have to be appointed for the channel. These small bunds will be washed away in the occurrence of heavy local rain. By this means the M.W.L. can be kept down to F.S.L. The effective lengths of these outlets are calculated to discharge the amount of drainage surplus intercepted at each of them.

11. With these improvements and after the channel has been restored to its original dimensions and with a small establishment at Verasolapuram to work the new head-sluice and regulating weir shutters the Pombay channel can take down a sufficient supply without any obstacle to the Pombay river and thence on to Villupuram taluk where it supplies the following tanks and then enters French territory:—

1. Kangianur tank.
2. Aryur do.
3. Orathur do.
4. Iyuragaram do.
5. Muthampoliam tank.
6. Poyapaukam do.
7. Kuppiampuliyur tank.
8. Thoravy tank.
9. Vakkur do.
10. Mathoor do.
11. Vathanoor tank.
12. Chinnapapasamudram tank.
13. Thunnel tank.
14. Kilakondur fields (shrotrium).
15. Kakakuppam fields.
16. Verasolapuram tank.
17. Arkadu tank.
18. Gúdalúr and Ayanthur fields.
19. Kalpathi tank.
20. Mambalapattu tank.
21. Mullipattu tank (zamien).

12. The present estimate amounts to Rs. 28,440; Rs. 16,260 for new masonry works, Rs. 12,180 for clearing and restoring channel to original state and repairing masonry works.

(Signed) A. W. SMART, Major, R.E.,
Executive Engineer.

24th September 1888.

Three lascars' sheds are provided in the estimate, revised in accordance with Chief Engineer for Irrigation's memo. No. V/38 S.A., dated 14th August 1889.

No. 99 I.

Note by the Chief Engineer for Irrigation.

In G.O., No. 815 I., dated 9th October 1883, estimates, amounting to Rs. 27,885, for improvements to the Pombay channel, in the South Arcot division, were sanctioned. The Superintending Engineer, V Circle, having in his No. 271, dated 18th April 1887, suggested the desirability of modifying some of the sanctioned arrangements, he was requested in this office memo. No. 12 S.A., dated 6th May 1887, to submit revised estimates for the works proposed to be carried out. In accordance with this request estimates, amounting to Rs. 25,960, were forwarded by the Superintending Engineer with his No. 4284, dated 14th December 1888, but as the plans were neither well drawn nor well designed they had to be returned for revision with this office memo. No. 38 S.A., dated 14th August 1889, and were resubmitted duly revised with Superintending Engineer's letter No. 401, dated 23rd April 1890. The revised estimates, the aggregate amount of which has been raised in this office from Rs. 28,440 to Rs. 29,600, are now recommended for sanction.

2. The corrections and remarks made on the plans should receive attention when the works are being carried out.

3. The Superintending Engineer should see that a careful specification for each work is prepared by the Executive Engineer before it is put in hand.

4. The Tirukoilúr anicut system, of which the Pombay channel is a component work, having been admitted in G.O., No. 286 I., dated 21st May 1890, into the category of "Works for which Capital and Revenue Accounts are kept," the estimates now recommended for sanction should be classified under that head, and not as in the case of the original estimates under "Irrigation and Navigation Works for which neither Capital nor Revenue Accounts are kept, but for which a continuous record of expenditure is maintained."

OOTACAMUND,
7th July 1890.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

To the Acting Secretary to Government,
Public Works Department.

ORDER—dated 16th July 1890, No. 391 I., Public Works.

The following revised estimates, amounting to Rs. 29,600, for improvements to the Pombay channel, in the South Arcot division, are sanctioned in supersession of the estimates aggregating Rs. 27,885 sanctioned for the work in G.O., No. 815 I., dated 9th October 1883 :—

Irrigation.
43. Minor Works and Navigation.
Irrigation and Navigation.
Works for which Capital and Revenue Accounts are kept.
Capital Account.
Tirukoilúr Anicut System.
South Arcot Division.
I. Works.
(2) Main Canals and Branches.
Pombay Channel.

		RS.	RS.
	D. Regulators.		
1.	Constructing a regulator at 3 miles 2 furlongs	2,655	
			2,655
	E. Falls and Weirs.		
2.	Constructing a regulating weir at 3 miles 2 furlongs ...	7,511	
3.	Do. surplus weir at 8 miles 1 furlong	680	
4.	Do. terminal drop at 10 miles 6 furlongs ...	1,340	
			9,531
	F (1). Other Cross Drainage Works.		
5.	Constructing Cuddalore outlet at 5 miles 6½ furlongs ...	1,225	
6.	Do. Ayandoor outlet at 6 miles 2 furlongs ...	1,440	
7.	Do. outlet at 7 miles 5½ furlongs	1,999	
			4,664
	L. Earthwork.		
8.	Clearing and restoring channel	11,700	
			11,700
	O. Miscellaneous.		
9.	Constructing 3 lascars' sheds	550	
10.	Repairing masonry works	500	
			1,050
	Total ...		29,600

2. This sanction has been registered as No. 37 I. of 1890-91.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
,, Superintending Engineer, V Circle, with twelve enclosures.
,, Examiner, Public Works Accounts.
,, Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 16*th*.

Recd. *Encl.*

G.O., 16th July 1890, No. 391 I.

JULY.

**Pombay Channel,
South Arcot District**

Revised estimates, amounting to Rupees 29,600, for improvements to the —, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper :—

Office note from the Examiner, Public Works Accounts, dated Madras, 2nd July 1890, No. 3897.

As the expenditure on the new works for which Capital and Revenue Accounts were ordered to be kept in G.O., No. 286 I., dated 21st May 1890, should be accounted for under the head "43. Minor Works and Navigation, Works for which Capital and Revenue Accounts are kept," please arrange to provide the necessary funds for these works under this head.

Order—dated 17th July 1890, No. 392 I., Public Works.

Communicated to the Superintending Engineers concerned who will apply at an early date for the necessary transfers of funds required for expenditure during the current year on the systems enumerated in para. 1 of G.O., No. 286 I., dated 21st May 1890, from the existing grants for the divisions in their respective circles under the head "43. Minor Works and Navigation, Irrigation and Navigation Works for which neither Capital nor Revenue Accounts are kept."

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
To Superintending Engineers.
To the Examiner, Public Works Accounts,
„ Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 17th.

Recd. *Encl.*

G.O., 17th July 1890, No. 392 I.

JULY.

Funds

Communicating, with remarks, office note from the Examiner, Public Works Accounts, requesting to arrange for the provision of — under the head "43. Minor Works and Navigation, Works for which Capital and Revenue Accounts are kept," for the new works for which Capital and Revenue Accounts were ordered to be kept.

/

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper :—

From J. W. MARTIN, Esq., Superintending Engineer, I Circle, to the Chief Engineer for Irrigation, dated Dowlaishweram, 20th June 1890, No. 337 G.N.

In forwarding, for sanction, a design and estimate, amounting Rs. 8,530, for constructing under-tunnel No. 8-A at $9\frac{13}{16}$ miles, Rushikulya canal, Rushikulya project, I have the honor to explain that under-tunnel No. 8 has already been constructed at $9\frac{13}{16}$ miles, and it is to supplement this that No. 8-A is proposed.

2. In letter, No. 299, dated 9th November 1889, from the Executive Engineer, Rushikulya division, forwarding the plan and estimate for No. 8-A, he reported that there was a fall of 3 inches of rain on the 15th August last when much drainage crossed the canal with the result that water rose to 2 feet above the crown of the arches of No. 8 under-tunnel, and at the same time the banks of the canal were breached, and water passed through two large breaches at $9\frac{5}{8}$ and $9\frac{13}{16}$ miles, respectively. He has not reported what was the level of water behind under-tunnel No. 8, but he reported that the area of the breaches was 132 and 298 square feet, making a total of 380 square feet.

3. Under-tunnel No. 8 was designed to discharge drainage from 7 square miles, but the Executive Engineer reported that, after a careful investigation, he made out that the actual drainage area is 10 square miles, and he suggested that drainage from this area should be calculated by the formula $D = C \sqrt[4]{M^3}$ taking as 675 against 500 used when calculating the drainage to be discharged through No. 8 under-tunnel, as there are rocky hills lying in the drainage area. This office, however, raised the question whether 825 would not be a more suitable co-efficient, seeing that a rainfall of only 3 inches produced so much drainage, and hence the delay in disposing of the proposal to build under-tunnel No. 8-A.

4. When I took charge the design for No. 8 under-tunnel was not in the office, but I received it subsequently, and then I noticed that the "Probable M.F.L." marked on it is + 158·00 against + 156·15, the crown of the arch. So the flood rose to only 156·15 + 2 = 158·15. This led me to suppose that for some reason all the water was not able to flow to the under-tunnel. Consequently I inspected the site last month when I was inspecting the canal and then I noticed that there are two nullahs, one leading to No. 8 under-tunnel, and one to site proposed for No. 8-A.

5. I then asked the Executive Engineer to investigate the matter further and send a sketch showing the course of each nullah. In his report, dated 1st June, he reports as follows :—

"I have the honor to forward, herewith, a survey of the land above the canal, from which it will be seen that there is only one nullah which bifurcates at station (5), one branch going to No. 8 under-tunnel, and the other to No. 8-A under-tunnel.

"The former was the original course, but has now become silted up and its bed is being cultivated. There is a bund at station (5) which sends most of the water to site proposed for No. 8-A under-tunnel.

"This bund will have to be cut so that the water may find its way equally to both under-tunnels. I do not think any diversion cut is necessary."

I should also mention that although there was very heavy rain last September and high floods over the country through which the canal runs, all the under-tunnels (they are completed for nearly 20 miles of the canal) appear to have acted satisfactorily, and the waterway in each case appeared sufficient except in the case of No. 8. Under these circumstances, I think the failure of No. 8, if it can be said to have failed, was due to the drainage area having been calculated incorrectly, and to the bifurcation in the main nullah, resulting in one branch going to site proposed for No. 8-A.

6. Regarding design for No. 8-A, the Executive Engineer has arranged it to discharge 1,620 cubic feet, arrived at as follows :—

Maximum discharge of drainage area of 10 square miles.	$= 675 \sqrt[4]{10^3}$ B. 793 c. ft. per 1″	
Discharge through No. 8 as per plan	=	2,150
	Balance ...	1,630 c. ft. per 1″

to be discharged through No. 8-A.

I think this proposal may be allowed to stand, for although the Executive Engineer in his letter embodied above says that most of the water flows to the site for No. 8-A, it is doubtful if this is really the case, because the water in August last rose in front of No. 8 under-tunnel to 158·15 against 158·00, the calculated M.F.L., so on that occasion the greater portion of the water, apparently, passed under under-tunnel No. 8.

ORDER—dated 17th July 1890, No. 393 I., Public Works.

The following estimate is sanctioned from the balance of the amount reserved for unforeseen works of the Rushikulya project, which will then be reduced to Rs. 21,385 :—

Famine Relief and Insurance.
35. Protective Irrigation Works.
Rushikulya Project.
I. Works.
(2) Main Canals and Branches.
Rushikulya Canal.
F. (1) Other Cross Drainage Works.

		RS.
Constructing an under-tunnel, No. 8-A., at $9\frac{13}{16}$ miles, Estimate	...	8,530

2. This sanction has been registered as No. 34 I. of 1890-91.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
,, Superintending Engineer, I Circle, with four enclosures.
,, Examiner, Public Works Accounts.
,, Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 17th.

Recd. *Encl.*

G.O., 17th July 1890, No. 393 I.

JULY.

Under-tunnel

Estimate of Rs. 8,530 for constructing an —, No. 8-A, at $9\frac{13}{16}$ miles, Rushikulya canal, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following papers :—

From the Superintending Engineer, I Circle, dated 5th July 1889, No. 866 G.D.

No. I—91-G.D.

Godávari left bank—Rajahmundry to Purushottapatnam.

With reference to letter, No. 866 G.D., dated 5th July 1889, the undersigned has the honor to say that there has been much too great delay on the part of the Executive Engineer in preparation of the estimate, and even now it is prepared not in accordance with orders, and in a way which renders it impossible to deal with it.

2. If the bank is to be used as a road, 15 feet top width would be necessary; if not, the same top width * as in the other flood embankments of the Godávari which are not roads would be ample; 12 feet top width as provided for in the estimate † is not suitable for either condition.

* 9 feet.

† Herewith returned with its accompaniments.

3. The Superintending Engineer should write to the President, District Board, Godávari, and inform him that if Local funds will not contribute towards the raising, which the high flood of recent years has shown to be necessary, being carried out with 15 feet top width, that top width will have to be made only 9 feet ‡ which is enough for the purposes of merely a flood bank, and that in that case the large contributions already made towards the embankment to fit it for a road will have been of little benefit to Local funds.

‡ If this is what the other flood banks are.

4. If the District Board still declines to contribute the difference between making the top width 9 feet and making it 15 feet, then the estimate should be submitted for making it of only the lesser of the two widths. The height above flood of 1886 should be the same as that of the embankment on right side of river—Visiswaram to Polaram.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

30th July 1889.

From the Superintending Engineer, I Circle, dated 3rd December 1889, No. 2200 G.D.

No. I—5-G.D.

Godávari left embankment—Purushottapatnam to Rajahmundry.

[Letter No. 2200 G.D., dated 3rd December 1889, from Superintending Engineer, I Circle.]

The undersigned is of opinion that the embankment might well have never been constructed; it was doubtless taken in hand originally partly as a road; but as it is now considered to be not of sufficient importance to maintain as a road, the question certainly arises, as suggested by the Superintending Engineer, whether it is worth raising at all.

2. The portion between Rajahmundry and just beyond the cross bank put at private cost a few years ago just above the Kotalingala temple must most certainly be made safe against all floods, because the existence of the river bank led to the formation of "Listerpetta" which would be destroyed were the bank to breach or be topped; that petta ought never to have been allowed to be formed where it is, and had the undersigned been in the district when it was started, he would have protested against it.

3. The portion of the bank between the cross bank above referred to and the Torrigedda probably should not be raised; in connection with this the undersigned is unable to understand the levels, &c., given in paras. 3 and 4 of the Superintending Engineer's letter; they probably refer to some orders issued in the district in order to carry out the instructions of the then Chief Engineer for Irrigation as laid down in para. 2 of his inspection notes with Proceedings of Madras Government, No. 580 I., dated 29th September 1887; those instructions are not perfectly clear, but the main drift of them is that, as to remove the bank altogether would cost too much, portions of it should be lowered to what may be necessary to let water which passes up the Torrigedda and spills over its left bank escape back to the river without being impounded to a much higher level than the water would rise to if there were no bank.

4. As regards the portion of the bank above the Torrigedda as it exists, it will probably be advisable to make it safe, as water passing in at breaches and then kept in by the bank might in parts do more harm than would have been done had there been no bank.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

9th January 1890.

From J. W. MARTIN, Esq., Superintending Engineer, I Circle, to the Chief Engineer for Irrigation, dated Dowlaishweram, 17th June 1890, No. 565 G.D.

Adverting to your memo. No. I—5-G.D., dated 9th January 1890, in the matter of Godávari left embankment from Purushottapatnam to Rajahmundry, I have the honor to resubmit the estimate revised according to your instructions and amounting to Rs. 14,350.

2. Regarding raising the embankment from Rajahmundry to Listerpetta, that is to near miles $1\frac{1}{8}$, it is already raised up to miles $3\frac{3}{8}$. The raising of this portion is therefore allowed to stand in the estimate, but there is no provision made for raising between miles $3\frac{3}{8}$ and Torrigedda outlet. As regards the bank above the outlet, provision is made in the estimate for making it safe in accordance with your instructions in para. 4 of your memorandum under reference.

3. In regard to making openings in the bank between Listerpetta and Torrigedda outlet, provision is made for cutting the bank, in three places, down to the level of the ground on river side. This ground is about the level water rises to when the depth on anicut is 11 feet, but the ground behind the bank is lower than the level of the land on the river side, so in any case it would be useless to cut down the bank lower than is provided for in the estimate.

No. 101 I.

Note by the Chief Engineer for Irrigation.

The estimate for raising the left embankment of the Godávari river between Purushottapatnam and Rajahmundry to 4 feet above the highest known flood is submitted for sanction.

2. In paras. 2 and 3 of the Superintending Engineer's letter, No. 565 G.D., dated 17th June 1890, he speaks of "Listerpetta" as if it were $1\frac{1}{8}$ miles above Rajahmundry; but this is not the case; that petta lies just at the back of the embankment contiguous to Rajahmundry and probably the Superintending Engineer really

means to refer to the cross bank just above the Kotalingala temple referred to in para. 2 of memo. No. I—5-G.D., dated 9th January 1890, which was constructed at private cost to protect the ill-placed "Listerpetta."

3. The raising between $1\frac{7}{8}$ to $3\frac{3}{8}$ miles ought not to have been done without sanction.

OOTACAMUND,
8th July 1890.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

To the Acting Secretary to Government,
Public Works Department.

ORDER—dated 18th July 1890, No. 394 I., Public Works.

The following estimate is sanctioned :—

Irrigation.
43. Minor Works and Navigation.
Agricultural Works.
River Embankment.
Original Works.
Godávari Eastern Division.

	RS.
Raising, &c., the Godávari left embankment from Rajahmundry to Purushottapatnam, Estimate	14,350

2. This sanction has been registered as No. 35 I. of 1890-91.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
,, Superintending Engineer, I Circle, with four enclosures.
,, Examiner, Public Works Accounts.
,, Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 18th.

Recd. *Encl.*

G.O., 18th July 1890, No. 394 I.

JULY.

Embankment

Estimate of Rs. 14,350 for raising, &c., the Godávari left — from Rajahmundry to Purushottapatnam, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following papers :—

Office note from the Examiner, Public Works Accounts, dated Madras, 22nd November 1889, No. 1663.

With reference to para. 1 of G.O., No. 494 I., dated 12th October 1889, communicating letter, No. 184 I., dated 14th September 1889, from the Government of India, and desiring me to report my views on the proposals made therein regarding the exhibition in the accounts of the old maintenance charges at certain fixed sums, as per statement A attached to the Government of India letter quoted above, I beg to state that there appears to be no objection to the adoption of these figures except in the case of the Sangam anicut project, for which the old maintenance charges should be taken at Rs. 25,000 as shown below, instead of at Rs. 8,000 as given by the Government of India :—

	RS.
Revised amount of old maintenance charges (direct) as per G.O., No. 477 I., dated 9th August 1888	15,225
Indirect charges (leave and pension allowances)	394
Total as per administrative accounts for 1888-89 ...	15,619
Add further charges for establishment as now proposed by the Government of India	...
Six per cent. on old irrigation revenue of Rs. 1,30,109	7,807
Leave and pension allowances at 14 per cent. on Rs. 7,807 ...	1,093
Total ...	24,519
or in round thousands	25,000

2. The statistical statements I-C, II-C, III-C and IV-C referred to in para. 6 of the Government of India letter may also be prepared so as to show both under revenue and working expenses the gross receipts and charges in the manner indicated in the revised forms attached to their letter. But as regards the suggestion made in the last paragraph of the letter, that the accounts and returns for 1888-89 be prepared in accordance with the new proposals, I beg to submit that as the accounts for 1888-89 have already been completed according to old instructions and rendered to the Government of India, the revised procedure may be adopted with effect from 1889-90, provided the Board of Revenue has no objection to the proposal referred to in para. 2 of the Government Order.

Proceedings of the Board of Revenue (Revenue Settlement, Land Records and Agriculture), dated 14th March 1890, No. 73.

MR. CLOGSTOUN.

Read—the following G.O., dated 25th November 1889, Mis. No. 7551, Revenue:—

Read—the following G.O., dated 12th October 1889, No. 494 I., Public Works:—

Read—the following letter from R. B. BUCKLEY, Esq., Under-Secretary to the Government of India, Public Works Department (Civil Works—Irrigation), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 14th September 1889, No. 184 I.:—

I am directed to invite your attention to Government of India, Public Works Department letter, No. 68 A-I., dated 17th May 1883, in which certain suggestions were made as to the procedure to be adopted for the exhibition, in the accounts, of the "Old Maintenance charges" and the "Share of Revenue due to Old Irrigation" on certain Irrigation works in Madras.

2. In para. 2-1 of that letter it was recommended that the gross revenue and maintenance charges of the old works prior to the improvements made by the British Government should be once and for all finally settled. This recommendation, it is observed, has not been adopted as far as revenue is concerned; whereas in the case of expenditure it has been, except in so far as concerns "Collection charges in the Civil Department," which, being calculated as a percentage on revenue, must necessarily vary as long as revenue varies.

3. It appears to the Government of India that it will much simplify the preparation of accounts and returns if the figures both for old Irrigation revenue and for old maintenance be finally fixed; the Governor-General in Council would be glad to be informed whether the Government of Madras has any objection to this arrangement.

4. It will be seen from the accompanying statement A that the revenue derived from the various projects, except in a few cases where the variations have been fully explained, has, during the five years ending with the year 1887-88, varied very slightly, and consequently it appears that the adoption of a definite figure will not appreciably affect the results to be shown. The last two columns of statement A show what figures it is suggested to assume as due to old Irrigation revenue and old maintenance charges. The figures have been taken in round thousands to show that the assumed amounts are intended to be approximations, and not precisely accurate calculations.

5. It will, of course, be understood that in the event of additional works being introduced into the category of works for which these old maintenance charges and revenue receipts are calculated, a corresponding fixed addition to the finally adopted figures of receipts and charges will be necessary.

6. I am further to suggest (with reference to para. 4 of the memorandum which accompanied Government of India, Public Works Department letter, No. 133-I of the 18th July last), for the consideration of the Government of Madras, that statements I-C, II-C, III-C and IV-C should be prepared so as to show both under "Revenue" and under "Working Expenses" the gross receipts and charges; that is, that the figures should be those pertaining both to the old irrigation and to the irrigation due to the new works. The four forms for the year 1887-88 have been recast in this manner, and the revised forms are attached to this letter. It will be noticed that the revised forms work up to totals which display the revenue and working expenses "due to improvements" and that the figures given correspond with the Administrative accounts.

7. In the event of the proposals now made being adopted, I am to suggest that, if practicable, the accounts and returns for 1888-89 be prepared in accordance therewith. In the event of the arrangement suggested in statement A being accepted by the Government of Madras, the calculations on page 67 of the last Administration Report need not be repeated in future.

ENCLOSURE.

STATEMENT A.—Share of Revenue due to old Irrigation.

System.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88.	Sum which it is proposed to assume as value of old Irrigation Revenue.	Fixed sum assumed for old maintenance charges.	Remarks.
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	
Godávari delta	1,23,634	1,24,604	1,23,246	1,22,787	1,24,333	1,24,000	9,000	
Kistna do.	73,302	74,235	73,062	72,784	74,984	75,000	5,000	Increase in 1885-86 due to inclusion of Sangam anicut system under "old Irrigation."
Pennér anicut	1,19,381	1,18,771	1,17,720	1,17,591	1,17,171	1,17,000	30,000	
Sangam do.	..	..	1,27,595	1,24,634	1,22,143	1,22,000	8,000	
Cauvery delta	23,47,698	23,53,288	23,61,242	23,63,290	(a) 22,54,009	22,54,000	2,89,000	(a) Decrease stated to be due to the transfer of certain Irrigation works in the Trichinopoly division hitherto shown under Cauvery upper anicut to "Irrigation and Navigation Works for which Capital and Revenue Accounts are not kept," *vide* page 34 of Administration Report.
Srívaikuntham anicut ..	79,452	79,439	79,507	79,479	79,301	79,000	13,000	
Barur tank	..	..	..	..	(b) 2,400	2,000	200	(b) Barur tank included for first time.
Chembrambakam tank ..	16,409	16,505	16,273	16,223	16,358	16,000	7,000	
Pálár anicut	1,13,426	1,17,632	1,17,536	1,17,157	(c) 1,20,617	1,21,000	4,000	(c) *Vide* page 50 of Administration Report.
Pelandorai anicut	3,178	3,160	3,236	3,196	3,336	3,000	200	
Madras water-supply, &c. ..	10,617	10,583	10,663	10,656	11,151	11,000	5,000	*Note.*—The charge for establishment "Collection charges" being a percentage (6 per cent.) on revenue, varies each year with the amount of revenue credited.
Total ..	28,87,097	28,98,217	30,30,080	30,27,797	29,25,803	29,24,000	3,70,400	

Enclosure No. 2.—I-C.—Statement showing the financial results of Irrigation works in the Madras Presidency for the year ending 31st March 1888.

Enclosure No. 3.—II-C.—Statement showing the financial results of Irrigation works in the Madras Presidency for the year 1887-88, based on actual receipts.

Enclosure No. 4.—III-C.—Demands and realizations during the year 1887-88 in the Madras Presidency.

Enclosure No. 5.—IV-C.—Statement showing the financial results of Irrigation works in the Madras Presidency for the year ended 1887-88, based on assessments of the year.

Order—dated 12th October 1889, No. 494 I., Public Works.

Communicated to the Examiner of Public Works Accounts, who will report his views on the proposals made by the Government of India.

2. The proposal, to fix finally the old irrigation revenue of the works for which capital and revenue accounts are kept, made in para. 3 of the Government of India letter, will be considered in the Revenue Department.

3. The following letter will be sent to the Government of India :—

(Here enter No. 495 I., dated 12th October 1889.)

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secy. to Govt., P.W.D.

Order—dated 25th November 1889, Mis. No. 7551, Revenue.

Referred to the Commissioner of Revenue Settlement, Land Records and Agriculture for remarks, with reference to the proposal of the Government of India referred to in para. 2 of the order.

(True Extract.)

(Signed) J. GROSE,
Ag. Secretary to Government.

Resolution—dated 14th March 1890, No. 73.

With the Government Order read above, the Government refers, for the remarks of the Board, a letter from the Government of India suggesting that the gross revenue due to old works prior to the improvements made by the British Government should be once and for all finally fixed instead of being calculated every year as at present.

2. The revenue due to old irrigation as now calculated comprises the following items :—

(1) The portion due to water of the consolidated assessment and quit-rent on *usual* wet lands *minus* the average of the remissions of the five years prior to the improvements. The revenue under this item is liable to vary when there is an increase or decrease in the assessment of usual wet lands, *i.e.*, lands irrigated under the old works. The increase will occur when lands irrigated under other works are brought under anicut irrigation and when lands under old works formerly occupied free of assessment or quit-rent are subsequently assessed to revenue. The decrease will occur when lands under occupation are relinquished.

(2) The average annual net receipts due to water during the five years preceding the improvements, from dry lands converted into wet and dry crops watered, from inam and zemindari lands charged for water and from second crop. There will be no variations under these items in the case of works which have been completed.

3. As explained in the correspondence ending with G.O., dated 16th June 1883, No. 477 I., the present method of calculating the revenue due to old irrigation is certainly the most accurate, but an examination of the statistics thus worked out shows that the fluctuations from year to year are generally very small and that for all practical purposes it would be sufficient to adopt the figures arrived at for the latest year as fairly representing the amount that should be credited to old Irrigation revenue in the future.

4. The Government of India proposes to take as the standard the actuals of 1887-88 in round figures. This may be done in the case of all the systems except the five noted on the margin. For the Kistna delta the revenue due to old irrigation which was first reported at Rs. 74,984 for 1887-88 was subsequently corrected into Rs. 72,407 in Board's Proceedings, dated 26th September 1888, No. 2801, printed in G.O., dated 27th May 1889, No. 252 I. In 1888-89 the amount fell to Rs. 71,469. During the past ten years (*vide* appendix A), the revenue due to old irrigation under this system has been decreasing, owing probably to the relinquishments of the usual wet lands. The standard revenue to be adopted in future should not therefore, the Board thinks, be fixed at more than Rs. 71,000. In the case of the Cauvery delta, the Board observes that certain works in the Trichinopoly district which were transferred in 1887-88 to "Irrigation and Navigation works for which Capital and Revenue accounts are not kept" have been since retransferred to the system. Taking into account the revenue due to these works, the portion due to old irrigation amounted to Rs. 23,62,984 in 1887-88 and Rs. 23,64,729 in 1888-89. The figures given in appendix A against this system exhibit a steady increase so that the standard (Rs. 22,54,000) proposed by the Government of India may safely be raised to Rs. 23,65,000. As regards the Pálár anicut it was discovered last year that some villages in the Arcot and Conjeeveram taluks irrigated from tanks fed by anicut channels from this river were by mistake omitted from the irrigation returns for previous years. Including those villages, the correct revenue due to old sources for fasli 1298 (1888-89) was Rs. 1,25,392. The standard revenue fixed for this system may, therefore, be raised to Rs. 1,25,000 in round numbers. For the Sangam anicut and the Barur tank, it is not yet possible to arrive at a fair estimate. Irrigation under these works has not yet sufficiently developed, as distributaries under these systems are, it is believed, still in course of construction, and the Board suggests that for some years to come the actuals of the revenue due to old irrigation for these systems should be calculated according to the existing method.

Kistna anicut.
Cauvery do.
Sangam do.
Pálár anicut.
Barur tank.

5. The following table shows in one view the amount that may be fixed once for all as the value of the old irrigation revenue for the several systems, with the exception of the Sangam anicut system and the Barur tank system :—

System.	Amount proposed by the Government of India.	Amount proposed by the Board.
	RS.	RS.
Godávari delta	1,24,000	1,24,000
Kistna "	75,000	71,000
Pennér anicut	1,17,000	1,17,000
Sangam "	1,22,000	..
Cauvery delta	22,54,000	23,65,000
Srívaikuntham anicut	79,000	79,000
Barur tank	2,000	...
Chembrambakam tank	16,000	16,000
Pálár anicut	1,21,000	1,25,000
Pelandorai anicut	3,000	3,000
Madras water-supply	11,000	11,000

(A true Copy and Extract.)

(Signed) P. RAJARATNA MUDALIAR,
Secretary.

APPENDIX A.

SHARE of revenue due to old irrigation.

Systems.	1879-80.	1880-81.	1881-82.	1882-83.	1883-84.
1	2	3	4	5	6
	RS.	RS.	RS.	RS.	RS.
Godávari anicut system	1,31,223	1,29,700	1,26,131	1,25,184	1,23,634
Kistna do.	79,327	77,031	75,926	75,102	73,302
Pennér do.	1,19,111	1,20,970	1,22,274	1,20,202	1,19,381
Cauvery do.	23,41,285	23,41,705	23,40,339	23,43,214	23,47,698
Srívaikuntham do.	77,549	77,510	77,634	77,642	79,452
Chembrambakam tank	16,256	16,228	16,169	16,157	16,409
Pálár anicut system	1,05,834	1,04,568	1,05,642	1,12,857	1,13,426
Pelandorai do.	3,119	3,119	3,119	3,186	3,178
Madras water-supply	10,187	10,198	10,208	10,313	10,617
Total ..	28,83,891	28,81,029	28,77,442	28,83,857	28,87,097

Systems.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.
	7	8	9	10	11
	RS.	RS.	RS.	RS.	RS.
Godávari anicut system	1,24,604	1,23,246	1,22,787	1,24,333	* 1,24,642
Kistna do.	74,235	73,062	72,784	72,407	71,469
Pennér do.	1,18,771	1,17,720	1,17,591	1,17,171	1,16,643
Cauvery do.	23,56,827	23,61,242	23,63,290	23,62,984	23,64,729
Srívaikuntham do.	79,439	79,507	79,479	79,301	79,116
Chembrambakam tank	16,505	16,273	16,223	16,221	16,219
Pálár anicut system	1,17,632	1,17,536	1,17,157	1,21,034	1,25,392
Pelandorai do.	3,160	3,236	3,196	3,187	3,365
Madras water-supply	10,583	10,663	10,656	10,758	10,658
Total ..	29,01,756	29,02,485	29,03,163	29,07,396	29,12,233

* Since revised.

No. 3086, Revenue.

Transferred to the Public Works Department with an expression of concurrence in the remarks of the Board of Revenue.

OOTACAMUND,
19th May 1890.

(Signed) C. A. GALTON,
Secretary to Government.

No. 102 I.

Note by the Chief Engineer for Irrigation.

In para. 5 of the Proceedings of the Board of Revenue, No. 73, dated 14th March 1890, are given the sums which it considers may, in accordance with the wishes of the Government of India expressed in its letter, No. 184 I., dated 14th September 1889, be fixed once for all as the revenue due to old irrigation under each of the Irrigation systems for which Capital and Revenue Accounts are kept, except for the Sangam anicut and the Barur tank project, under which the Board suggests that the revenue due to old irrigation may continue for the present to be calculated according to the existing method. The amount of old irrigation revenue under the Sangam anicut project during 1888-89 was Rs. 1,30,103, and that under the Barur tank project Rs. 2,332, and as it is desirable that the same method should be adopted for all the Irrigation systems, it is suggested that the old Irrigation revenue under these two projects may be fixed at Rs. 1,30,000 and 2,000, respectively, subject to modification if actuals hereafter show a material difference from those amounts.

2. The subjoined statement shows the sums at which it is proposed to fix the "old irrigation revenue," and "old maintenance charges" for each of the systems under notice :—

—	Old irrigation revenue.	Old Maintenance charges.						
		Direct charges.					Indirect charges.	
				Establishment.				
		Extensions and Improvements.	Maintenance and Repairs.	23 per cent. on expenditure.	6 per cent. on revenue.	Tools and Plant.	Leave and Pension allowances.	Total.
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
Godávari delta	1,24,000	..	..	..	7,450	..	1,050	8,500
Kistna do.	71,000	..	..	..	4,260	..	640	4,900
Pennér anicut	1,17,000	3,564	13,860	4,007	7,020	5	1,544	30,000
Sangam do.	1,30,000	345	11,884	2,813	7,800	172	1,486	24,500
Cauvery delta	23,65,000	..	1,05,634	24,296	1,41,900	1,603	23,267	2,96,700
Srívaikuntham anicut ..	79,000	352	5,208	1,279	4,740	78	843	12,500
Barur tank	2,000	..	..	..	120	..	30	150
Chembrambakam tank ..	16,000	2,283	3,097	1,238	..	109	173	6,900
Pálár anicut	1,25,000	178	2,909	710	..	4	99	3,900
Pelandorai anicut ..	3,000	59	58	27	..	2	4	150
Madras water-supply and irrigation extension project	11,000	3,600	200	870	..	10	120	4,800
Total ..	30,43,000	10,381	1,42,850	35,240	1,75,290	1,983	29,256	3,93,000

Ootacamund,
9th July 1890.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

To the Acting Secretary to Government, Public Works Department.

Order—dated 18th July 1890, No. 395 I., Public Works.

The sums of "old Irrigation revenue" and "old Maintenance charges" for each of the 11 systems as shown in the statement in para. 2 of the foregoing note by the Chief Engineer for Irrigation are approved and will be adopted in the accounts and returns for and after 1889-90.

2. The following letter will be sent to the Government of India :—

(Here enter No. 396 I., dated 18th July 1890.)

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Superintending Engineer, I Circle.
" Do. II "
" Do. IV "
" Do. V "
" Do. VI "
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 18th.

Recd. *Encl.*

G.O., 18th July 1890, No. 395 I.

JULY.

Irrigation Works in Madras

Approving the proposal for fixing once for all the "old Maintenance charges" and the "spare Revenue due to old irrigation" on the — for which Capital and Revenue Accounts are kept.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Letter—from

G. T. WALCH, Esq.,

Acting Secretary to the Government of Madras,

Public Works Department,

To

The SECRETARY to the GOVERNMENT of INDIA,

Public Works Department.

Sir,

In continuation of my letter, No. 495 I., dated 12th October 1889, I am directed to forward, herewith, a copy of Proceedings of Madras Government, No. 395 I., dated 18th July 1890.

2. I am further to suggest that column 27 of statement I-C may be divided into three columns showing separately the "Direct charges," "Indirect charges" and their "Total."

I have the honor to be,
Sir,
Your most obedient servant,

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

Ootacamund,
18th July 1890.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 18th.

Recd. *Encl.*

18th July 1890, No. 396 I.

JULY.

Irrigation Works in Madras

Forwarding copy of Proceedings approving the proposal for fixing once for all the "old Maintenance charges" and the "spare Revenue due to old irrigation" on the — for which Capital and Revenue Accounts are kept.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper: —

From J. W. MARTIN, Esq., Superintending Engineer, I Circle, to the Chief Engineer for Irrigation, dated Dowlaishweram, 25th June 1890, No. 353 G.N.

With reference to your memo. No. 1-28 G.N., dated the 3rd June 1890, I have the honor to inform you that the Ganjam Division officer now reports that Rs. 2,000 are required for the current year for deepening the Chilka Lake canal, Capital Account, and to request that you will be so good as to have the above sum allotted as early as possible. Before the receipt of your memorandum under reply I wrote to the Executive Engineer about funds for the work.

2. The amount, Rs. 5,267, applied for (in my statement of incomplete works) for clearing silt in the Chilka Lake canal under Revenue Account requires no modification at present.

3. The remarks made by the Division officer on the E form progress report for April 1890 are incorrect.

Order—dated 19th July 1890, No. 397 I., Public Works.

The following transfer of funds is sanctioned :—

Provincial.
43. Minor Works and Navigation.

From Irrigation and Navigation. Works for which neither Capital nor Revenue Accounts are kept. Repairs.	RS.	*To* Irrigation and Navigation. Works for which Capital and Revenue Accounts are kept. Capital Account.	RS.
Reserve	1,976	Chilka Lake canal, deepening ...	2,000
Establishment	454	Establishment	460
Tools and plant	30		
Total ...	2,460	Total ...	2,460

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, I Circle.
„ Examiner, Public Works Accounts.
„ Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 19th.

Recd. *Encl.*

G.O., 19th July 1890, No. 397 I.

JULY.

Transfer of Funds

Sanctioning certain —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

From J. W. MARTIN, Esq., Superintending Engineer, I Circle, to the Chief Engineer for Irrigation, dated Dowlaishweram, 2nd July 1890, No. 660 G.D.

Adverting to your memo. No. 60 G.D., dated 29th May 1890, in the matter of the steamer *Shamrock*, I have the honor to forward a formal estimate, amounting to Rs. 5,000, for providing a new boiler. The old one is a locomotive boiler and the estimate provides for a new one of the same description; for a locomotive boiler is lighter than an ordinary marine one, and, consequently, the *Shamrock* with a locomotive boiler will draw less water than she would if a marine boiler is provided. Moreover, all her fittings are now suited for a locomotive, whereas if a marine one is provided some of the fittings will have to be altered.

2. Regarding the present state of the hull, Mr. Vanstavern, late Executive Engineer, Public Works Department, who knows the vessel well, was kind enough to examine her and submit a report on her present state. I am sending you a copy of his report, from which you will observe that he considers the hull is in a fairly good state. The *Shamrock* is now in the dry dock, and I myself have examined her. Her bottom and sides appear to be in good order, the plates being about a quarter of an inch thick. I may also mention that a length of about 30 feet of the hull was renewed in August 1877.* In these circumstances, I consider a new boiler should be provided, particularly as the *Shamrock* is a very useful steamer.

* Probably 1887.
(Intld.) G.T.W.

3. I am sending an application for a new boiler in the form circulated with G.O., No. 1679 W., dated 2nd July 1886, but I cannot fill in the columns under "estimated cost if obtained through the India Office" for I do not know the English price of boilers. I recommend, however, that the boiler should be purchased in India to save delay. At present we have only two steamers fit for work, viz., the *Victoria* and the *John Mullins*. The *Arthur Cotton* is laid up for want of a new boiler which, however, has been ordered. But even if we had three steamers fit for work, it would be still advisable to provide a new boiler for the *Shamrock*, as soon as possible, for four steamers are necessary for requirements.

4. The proposed expenditure cannot be met from the existing grant for the current year under 42. Major Works (Working Expenses), Tools and Plant, for the sum available is only Rs. 2,000.

ORDER—dated 19th July 1890, No. 398 I., Public Works.

The following estimate is sanctioned :—

Irrigation.
42. Major Works. (Working Expenses).
Godávari Delta System.
Eastern Section.
III. Tools and Plant.
New Supplies.

	RS.
Purchasing and fitting a new boiler to the steamer *Shamrock*, Estimate	5,000

2. This sanction has been registered as No. 36 I. of 1890-91.

3. The Superintending Engineer is authorised to purchase the new boiler in India.

4. As only Rs. 2,000 are reported to be available from the current year's existing grant for tools and plant under "42. Major Works (Working Expenses)," the Superintending Engineer should report, at an early date, whether the balance of Rs. 3,000 of the amount required to meet the proposed outlay can be provided from the existing grant for "Revenue Extensions and Improvements."

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
,, Superintending Engineer, I Circle, with five enclosures.
,, Examiner, Public Works Accounts.
,, Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 19th.

Recd. *Encl.*

G.O., 19th July 1890, No. 398 I.

JULY.

Steamer " Shamrock "

Estimate of Rs. 5,000 for purchasing and fitting a new boiler to the —, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper :—

From H. H. O'CONNELL, Esq., Executive Engineer, Nellore Division, to the Superintending Engineer, II Circle, dated Nellore, 16th June 1890, No. 97.

As there is no allotment under 43. Minor Irrigation Original Works for improving Pedda Puttedu tank, sanctioned in G.O., No. 262 I., dated 30th April 1890, for Rs. 5,200, I have the honor to request that you will be pleased to transfer Rs. 5,200 from the grant of Rs. 80,000 for repairs.

2. Arrangements have been made to start the work.

No. 215 N.L.

Copy submitted to the Chief Engineer for Irrigation for favor of necessary transfer of funds as applied for in the foregoing letter.

(Signed) J. HANNAN,
Superintending Engineer, II Circle.

2nd July 1890.

Order—dated 19th July 1890, No. 399 I., Public Works.

The following transfer of funds is sanctioned :—

43. Minor Works and Navigation.
Irrigation and Navigation Works for which neither Capital nor Revenue Accounts are kept.
Nellore Division.

From		*To* Original Works. Major.	
	RS.		RS.
Repairs	5,200	Improving Pedda Puttedu tank ...	5,200

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Superintending Engineer, II Circle.
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 19th.

Recd. *Encl.*

G.O., 19th July 1890, No. 399 I.

JULY.

Transfer of Funds

Sanctioning certain —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

General.
Establishment.

Read—the following papers :—

G.O., dated 4th June 1890, No. 24, Legislative.

Read—the following letter from S. HARVEY JAMES, Esq., Secretary to the Government of India, Legislative Department, to the Chief Secretary to the Government of Madras, dated Simla, 14th May 1890, No. 807 :—

Bill to make better provision for the establishment of Canals and Public Ferries in the Presidency of Madras and for the management thereof.

I am directed to return, herewith, with the assent of His Excellency the Viceroy and Governor-General signified thereon, the authentic copy of the Bill noted on the margin, which was received with your letter, Legislative No. 20, dated the 9th ultimo, to the address of the Secretary to the Government of India in the Public Works Department.

Order—dated 4th June 1890, No. 24, Legislative.

Communicated to the Public Works Department (Irrigation Branch) for the necessary action.

2. The Act, as assented to by His Excellency the Governor-General, will be published in the *Fort St. George Gazette* in English and in the several Vernaculars.

3. The assent of His Excellency the Governor-General to the Act will be communicated to the Council for making Laws and Regulations.

Office note from the Assistant Secretary, Legislative Department, dated 4th July 1890, No. 107.

Order—dated 23rd July 1890, No. 402 I., Public Works.

Communicated to the Chief Engineer for Irrigation and to Superintending Engineers.

2. The following notification will be published in the *Fort St. George Gazette* :—

"Madras Act No. II of 1890 (an Act to make better provision for the establishment of canals and public ferries in the Presidency of Madras and for the management thereof) having received the assent of His Excellency the Viceroy and Governor-General in Council, and having become law, His Excellency the Governor in Council directs that the aforesaid Act shall come into force and take effect from and after the 1st August 1890."

3. The following notification will be published in the *Fort St. George Gazette*, and in the Gazettes of the districts named :—

"His Excellency the Governor in Council is pleased to declare, under the provisions of section 4 of Madras Act II of 1890 (an Act to make better provision for the establishment of canals and public ferries in the Presidency of Madras and for the management thereof), that the undermentioned lines of navigation shall, from the 1st August 1890, be subject to the provisions of the said Act.

" The Chilka Lake Canal (Ganjam District).
The Dumagudem Canal (Godávari District).
The navigable canals in the Godávari and Kistna Districts.
The Buckingham Canál (Kistna, Nellore, Chingleput, Madras and South Arcot Districts).
The Vedarniem Canal (Tanjore District)."

4. The Chief Engineer for Irrigation will submit a draft of the rules to be framed under section 16 of the Act. Until such rules have been approved, those now in existence on the various canals will continue in force.

5. The requisite action under section 8 of the Act with respect to ferries will be taken in the Revenue Department.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
To Superintending Engineers.
To the Revenue Department.
" Legislative Department.
" Superintendent, Government Press.

GENERAL.
ESTABLISHMENT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 23rd.

Recd. *Encl.*

G.O., 23rd July 1890, No. 402 I.

JULY.

Canals and Public Ferries Act

Bringing into force the — of 1890.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Read—the following paper :—

Proceedings of the Board of Revenue (Land Revenue), dated 5th July 1890, Mis. No. 4254.

Mr. H. W. Bliss.

Read—the following letter from the Collector of Tanjore, dated 27th June 1890, No. 418 :—

I have the honor to inform you that a piece of land, measuring acre 1 and cents 38, in Eachangudi village, Kumbakónam taluk, is required for the Cauvery left bank at that place.

2. The land belongs to the Tanjore Palace Estate, and as it is desirable, in order to ensure to Government an indefeasible title to it, to acquire it under the provisions of the Land Acquisition Act X of 1870, I herewith forward a draft declaration under section 6 of the Act that it is needed for a public purpose, and request that you will be good enough to order the same to be published in the *Fort St. George Gazette.*

3. I further request the orders of Government for its acquisition.

Resolution—dated 5th July 1890, Mis. No. 4254.

Submitted to Government for approval and publication.

(A true Copy and Extract.)

(Signed) A. G. CARDEW,
Acting Secretary.

Mis. No. 4309, Revenue.

Transferred to the Public Works Department.

Ootacamund,
12th July 1890.

(Signed) C. A. GALTON,
Secretary to Government.

Order—dated 23rd July 1890, No. 403 I., Public Works.

Ordered that the notification be published in the *Fort St. George Gazette.*

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Superintending Engineer, VI Circle.
" Revenue Department.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 23rd.

Recd. *Encl.*

G.O., 23rd July 1890, No. 403 I.

JULY.

Land

Ordered that the notification for the acquisition of — required for the Cauvery left bank in Eachangudi village, Kumbakónam taluk, Tanjore district, be published in the *Fort St. George Gazette.*

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Read—the following paper :—

G.O., dated 10th July 1890, No. 4240, Revenue.

Read—the following Proceedings of the Board of Revenue (Land Revenue), dated 4th June 1890, Mis. No. 3451, on letters from the Collector of Tanjore, dated 28th September 1889 and 25th April 1890, Nos. 668 and 262 respectively, and the following Reference on the former, dated 7th January 1890 :—

I have the honor to bring the following case to the notice of the Board.

2. On 25th June 1888, under the orders of the Executive Engineer, Negapatam, the lease of some cocoanut trees standing in the backyard of a manaikat belonging to one Sambasiva Aiyar residing in Mannárgudi Municipality was sold by public auction.

3. I have personally inspected the spot and find that the trees in question are close to the margin of the river Pamanyar which here flows in its natural bed without artificial embankments. They are situated at the back of a house in a Brahmin street within the Municipal town.

4. The reasons for the sale appear to be—

(1) That the kurnam gave a list to the Assistant Engineer showing these trees as belonging to Government and in charge of the Public Works Department (Superintending Engineer's letter No. 326 T.J., dated 15th May 1889).

(2) That they are within 20 yards of river margin and have on that account been exempted from tax and therefore they do not belong to the mirasidar.

G.O., No. 448 R., dated 20th April 1885.
G.O., „ 441 R., „ 6th „ 1880.

5. As regards the first reason it appears from the marginally noted Government Orders (1) that Government fully recognizes the right of the mirasidar to trees such as these planted on river banks, and (2) that trees growing on the natural banks of rivers are under the control of the officers of the Revenue Department and not of the Public Works Department.

6. *As to the second reason for the sale.*—By a district order of 1864 trees then growing within 20 yards of the river-bed were exempted from tax, the mirasidars being still allowed the usufruct, and further planting within such limits was forbidden. Whether this order was or was not *ultra vires* is not now the question. The mere fact that under it the mirasidar has since paid no tax for the trees does not constitute a reason for their public sale nor warrant the assumption that they are public property.

7. The action of the Executive Engineer appears to be based on the kurnam's statement alone, and it is said the kurnam is on bad terms with the mirasidar in question. The fact that other trees similarly situated in backyards in the same street have not been sold tends to confirm this statement.

8. I have on a previous occasion expressed the opinion that the officers of the Public Works Department should confine their attention to conservancy proper, and should be forbidden to levy rent, which is properly land revenue, upon lands under their control. In the present case these few cocoanut trees are of many years standing; were probably planted, as alleged, by the ancestors of Sambasiva Aiyar, and if they were leased out at all, ought to have been given to him on payment of a reasonable rent. I have represented this to the Superintending Engineer, but he supports his subordinate (Mr. Manson), and the latter tells me in effect to mind my own business. I enclose correspondence as per margin.

Para. 3 of letter No. 350, dated 18th June 1888, printed with G.O., No. 139 I., Public Works Department, dated 15th March 1889.

Letter from Deputy Collector, Mannárgudi, No. 15, dated 8th January 1889.
Letter to Superintending Engineer, No. 1601, dated 13th March 1889.
Letter from Superintending Engineer, No. 326 T.J., dated 15th May 1889.
Copy of Mr. Manson's letter No. 1210, dated 30th April 1889.
Superintending Engineer's letter No. 806 T.J., dated 13th July 1889.

In reply to the Board's Reference on General Register No. 3057, dated 7th January 1890, I have the honor to report that the field (No. 1085) on which the cocoanut trees stand is according to the paimash 147¼ gulies in extent, of which 87¼ gulies are measured as house-site and backyard and the remaining 60 gulies on the riverside as assessed garden land. From the inquiries made it appears that the garden land, viz., 60 gulies, was under occupation from time previous to the paimash, viz., fasli 1239; that 27½ gulies of it were transferred in fasli 1274 from "Assessed" to "Poramboke padugai," and that Sambasiva Aiyar has been enjoying the trees for the last 30 years since their planting without paying any tax. The transfer to the poramboke above referred to is called "redemption," in the Deputy Collector's letter No. 15, dated 8th January 1889.

2. I send herewith a translation of Mr. Cadell's order of 1864, together with that of 1852 referred to therein.

3. The transfer from "Assessed" to "Poramboke" was made with reference to Mr. Cadell's order of 1864. This order refers exclusively to land granted on putta in violation of Mr. Goodwin's order of 1852 (fasli 1261) and was no sufficient authority for the transfer in the case in question wherein the land was in occupation even before the paimash of fasli 1239. The party does not appear to have objected to the transfer, while on the other hand Government has levied no tax on the trees during the last thirty years.

4. The enclosures received with the Board's reference are returned.

The Deputy Collector and the Executive Engineer say that the trees in question are in the Pamanyar river margin, and the former officer states that the trees and the land on which they stand were redeemed in fasli 1274. The Collector on the other hand says that the trees are in the backyard of a manaikat belonging to one Sambasiva Aiyar and are close to the margin of the river. It is not clear therefore whether the land on which the trees stand belongs to Government or is private property. The Collector is requested to report on this point and to forward a copy of the district order of 1864 referred to in the correspondence.

Resolution—dated 4th June 1890, Mis. No. 3451.

Submitted for the orders of Government.

2. The Board agrees with the Collector in considering that the land on which the trees in question stand is under the control of the Collector and not under that of the Public Works Department. It also considers that the trees belong to Sambasiva

Aiyar and should not have been leased by Government, and that the lease should be cancelled at once so far as those trees are concerned, compensation being paid to the lessee.

3. The Collector will report whether there are many other cases in his district in which tax has been improperly remitted in the way here brought to notice and the amount of revenue involved.

Order—dated 10th July 1890, No. 4240, Revenue.

The Government agrees with the Board of Revenue.

2. The necessary orders will issue in the Public Works Department.

(True Extract.)

(Signed) C. A. GALTON,
Secretary to Government.

ORDER—dated 24th July 1890, No. 404 I., Public Works.

Communicated to the Superintending Engineer, VI Circle, for information and guidance.

2. The Executive Engineer, Negapatam Division, will at once furnish the Collector of the district with the particulars of any lease now in force with reference to the trees in question, and with the date from which that lease is cancelled, and the Collector will settle the amount of compensation to be paid to the lessee.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
,, Superintending Engineer, VI Circle.
,, Examiner, Public Works Accounts.
,, Revenue Department.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 24th.

Recd. *Encl.*

G.O., 24th July 1890, No. 404 I.

JULY.

Cocoanut Trees

Passing orders on Proceedings of the Revenue Department regarding the leasing of — on the Pamanyar bank, Mannárgudi, claimed by K. Sambasiva Aiyar.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following papers:—

Letter from the Superintending Engineer, III Circle, dated 8th July 1890, No. 996.
Memorandum to the Superintending Engineer, III Circle, dated 15th July 1890, No. III/13 K.C.

ORDER—dated 24th July 1890, No. 405 I., Public Works.

The following estimate is sanctioned:—

42. Major Works (Working Expenses).
Extensions and Improvements.
(2) Main Canals and Branches.
D. Regulators.
Kurnool-Cuddapah Canal.
First Section.

	RS.
Improving and providing shutters and screw gearing, &c., for the regulator at Kurnool, estimate	4,060

2. This sanction has been registered as No. 38 I. of 1890-91.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Superintending Engineer, III Circle, with enclosures.
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 24th.

Recd. *Encl.*

G.O., 24th July 1890, No. 405 I.

JULY.

Regulator at Kurnool

Estimate of Rs. 4,060 for improving and providing shutters and screw gearing, &c., for the —, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper :—

From J. HANNAN, Esq., Superintending Engineer, II Circle, to the Chief Engineer for Irrigation, dated 19th June 1890, No. 773 K.S.

I have the honor to forward herewith, for approval and sanction of Government, an estimate, amounting to Rs. 11,827, for excavating Aripirala branch (and its minor distributary) from the Dosapad channel at 12 miles 16 chains of the Ryves' canal.

2. The necessity for this channel is explained in the report accompanying the estimate, and its position is shown on the tracing attached to this report. In this connection please refer to section IX, paras. 18, 19 and 20 of Major Campbell's report printed with G.O., No. 3528 A of 22nd December 1876. The original proposal was to utilize the portion of the Moparru channel east of the Perikeed road. But when in charge of the Gudiváda division, I pointed out to Mr. Rundall and Colonel Hasted that this was not desirable as it was a broad deep channel as may be imagined from the fact that it carried the whole supply for nearly all the land irrigated to the east of the Gudiváda-Perikeed road and between the Budemeru and the Chendroya drain and which is at present supplied by the new Dosapad channel. These officers agreed with me and accepted the line now proposed. The matter was not, however, put on record.

3. The left bank of the Moparru channel from its head to where the Aripirala channel crosses it will be strengthened so as to form a flood bank, and from this point the left bank of the Aripirala channel will be similarly converted into a flood bank as far as Aripirala. Beyond this it is not desirable at present to continue it or to confine the Budemeru, which now in high floods spreads over the country but without doing much harm.

4. A small sluice will be required in the left bank of the Moparru channel where the Pamulapad branch crosses it, which has not been provided in the estimate. It will be provided in the estimate for the bank which the division officer has been requested to prepare, or charged to the contingencies of this estimate.

5. The amount of the estimate can be met from the balance available for unforeseen works of the Kistna Delta system.

ENCLOSURES.

ESTIMATE Form—Abstract—Classified.

Sub-head.	Names of works.	Amount of estimate for individual work.	Total of sub-heads.	Total for each canal or distributary.	Total of each main head.
1	2	3	4	5	6
		RS.	RS.	RS.	RS.
	Aripirala Branch.				
B. Land ..	Compensation for land	1,070	1,070		
C. Works ..	Head-sluice to Aripirala branch	905			
	Culvert on Parikeed road	885			
	Head-sluice to Rachakodu	390			
	Do. to Vennukodu	390			
	Do. to Aripirala Puntakodu	390			
	Regulator at tail	455	3,415		
L. Earthwork ..	Excavating channel	5,250	5,250		
O. Miscellaneous ..	Fixing demarcation stones	155	155	9,890	
	Pamulapad Minor Branch.				
B. Land ..	Compensation for land	550	550		
C. Works ..	Regulator	185	185		
L. Earthwork ..	Excavating channel	1,110	1,110		
O. Miscellaneous ..	Fixing demarcation stones	65	65	1,910	11,800

19th June 1890.

(Signed) J. HANNAN,
Superintending Engineer, II Circle.

REPORT to accompany the Estimate for excavating a new branch from the Dosapad Channel at 12 miles 51 chains to supersede the old Moparru Channel.

The Moparru channel is at present supplied by a head-sluice out of the Budemeru, situated just above a weir built across the Budemeru.

2. Water is let into the Budemeru from the Ellore canal through the old head-sluice to Ryves' canal.

3. The weir across the Budemeru is objectionable, and the Moparru channel is a broad old channel which wastes a large quantity of water, and it is therefore proposed to supersede it by a branch from Dosapad channel taking off at 12 miles 16 chains.

4. The general alignment of the branch was, it is understood, approved of some years ago.

5. The branch which it is proposed to name the Aripirala branch will take off above the drop bridge on the Perikeed road, as it is found that the water will not command the old lands formerly irrigated by the Moparru channel unless this is done.

6. The branch will flow in a northerly direction to Aripirala. It will cross the old Moparru channel at 2 miles 20 chains, and will then be taken along parallel and close to the old channel, utilizing the left bank of the old channel as the right bank for the new.

7. The Aripirala branch will discharge into the Bhumi Kodu from which the existing channels are sufficient for present purposes of irrigation.

8. At the point where the main branch turns off towards Aripirala before crossing the Perikeed road a minor distributary to irrigate 500 acres in the vicinity of Moparru will be thrown off. This minor distributary is necessary to irrigate lands that were formerly under Moparru channel and whose supply would otherwise be cut off by the new arrangement.

9. The following table gives the necessary information regarding the Aripirala branch, and the minor distributary, as regards bottom width, depth of water, discharge, &c.

Mileage. From	Mileage. To	Area to be irrigated.	Discharge required.	Actual discharge.	Bottom width.	Depth of water.	Bed and surface fall.
			Aripirala Branch.				
M. CHS.	M. CHS.						
0 0	0 $39\frac{1}{6}$	4,500	76·27	77·03	12·5	3·5	0·75
0 $39\frac{1}{6}$	1 $59\frac{1}{6}$	4,000	72·72	74·26	12·0	3·5	0·75
1 $59\frac{1}{6}$	2 $26\frac{25}{33}$	3,500	63·63	63·30	10·0	3·5	0·75
2 $26\frac{25}{33}$	2 $75\frac{6}{11}$	3,200	58· 2	59·68	9·5	3·5	0·75
2 $75\frac{6}{11}$	3 $65\frac{6}{11}$	2,600	52· 0	53·24	8·0	3·5	0·75
3 $65\frac{6}{11}$	4 $23\frac{19}{23}$	2,200	44	44· 8	6·5	3·5	0·75
			Pamulapad Branch (Minor Distributary.)				
0 0	0 40	500	13·70	14· 5	3·5	2·5	0·75
0 40	1 70 or to tail.	100	3· 6	13·61	3·0	2·5	0·75

10. The masonry works required are a head-sluice at 12 miles 16 chains of Dosapad channel, a small regulator to the minor distributary, a tunnel under the Perikeed road, three head-sluices to existing distributaries and a tail escape.

11. The head-sluice is designed to discharge sufficient water for 4,500 acres with an ordinary supply 6 inches below full supply level.

12. It is intended to excavate the branch during this working season, and so early sanction is requested. Data for the various descriptions of work are attached to the estimate.

(Signed) A. B. TODD,
Executive Engineer, Gudiváda Division.

No. 103 I.

Submitted to Government.

Ootacamund,
15th July 1890.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

To the Acting Secretary to Government,
Public Works Department.

Order—dated 25th July 1890, No. 406 I., Public Works.

The following estimate is sanctioned from the balance of the sum available for unforeseen works of the Kistna Delta System which will then be reduced to Rs. 1,81,547 :—

49. Capital Expenditure on Irrigation Works not charged to Revenue.
Kistna Delta System.
Gudiváda Division.
I. Works.
(3) Distributaries.
Ryves' Canal.
L. Earthwork.

	RS.
Excavating Aripirala channel (a branch of the Dosapad channel) and its minor distributary, estimate	11,800

2. This sanction has been registered as No. 39 I. of 1890-91.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Superintending Engineer, II Circle, with enclosures.
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 25th.

Recd. *Encl.*

G.O., 25th July 1890, No. 406 I.

JULY.

Aripirala Channel, Kistna District

Estimate of Rs. 11,800 for excavating — (a branch of the Dosapad channel) and its minor distributary, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Read—the following paper :—

From C. VINCENT, Esq., Under-Secretary to the Government of India, Public Works Department (Civil Works—Irrigation), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 9th July 1890, No. 116 I.

With reference to correspondence ending with your letter No. 300 I., dated the 23rd May 1890, forwarding a copy of the Proceedings of the Government of Madras, No. 299 I. of the same date, in which the Local Government expressed its concurrence with the opinions of the Chief Engineer, Periyár Works, that the prospects of the project remain practically unchanged, I am directed to state that the Government of India is pleased to extend the sanction accorded by the Secretary of State in 1884, which expired in October 1889, until the 30th September 1894.

Order—dated 25th July 1890, No. 407 I., Public Works.

Communicated to the officers concerned.

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Chief Engineer, Periyár Project.
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 25th.

Recd. *Encl.*

G.O., 25th July 1890, No. 407 I.

JULY.

Periyar Project

Letter from the Government of India extending the sanction to the — until 30th September 1894, communicated to the officers concerned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following papers :—

Office note to the Examiner of Public Works Accounts, dated					9th June 1890, No.				113.
Office note from the	„	„	„	„	„	21st	„	„	„ 3647.
Office note to the	„	„	„	„	„	4th July	„	„	„ 130.
Office note from the	„	„	„	„	„	12th	„	„	„ 4170.

No. 104 I.

Submitted to Government.

2. The figures representing expenditure have been verified by the Examiner of Public Works Accounts, but are liable to slight alterations on the final closing of the accounts for 1889-90.

3. In the note by the Chief Engineer for Irrigation embodied in Proceedings of the Madras Government No. 297 I., dated 22nd May 1890, a copy of which has been communicated to the Government of India, the causes of short and excess outlay have already been explained.

Ootacamund,
18th July 1890.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

To the Acting Secretary to Government,
Public Works Department.

Order—dated 28th July 1890, No. 408 I., Public Works.

Ordered that the accompanying statement be submitted to the Government of India.

(Here enter No. 409 I., dated 28th July 1890.)

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
To Superintending Engineers.
To the Examiner, Public Works Accounts.
„ Revenue Department.

Endorsement—dated 28th July 1890, No. 409 I., Public Works.

Forwarded.

(By Order.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 28th.

Recd. *Encl.*

G.O., 28th July 1890, Nos. 408 I., 409 I.

JULY.

Capital Expenditure on Irrigation Works

Forwarding statement showing progress of – not charged to Revenue for 1889-90.

STATEMENT SHOWING THE PROGRESS OF CAPITAL EXPENDITURE ON PUBLIC WORKS NOT CHARGED TO REVENUE FOR THE YEAR 1889-90.

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
GODAVARI DELTA SYSTEM.					
Old outlay	42,99,072	..	..	42,99,072	
(1) HEAD WORKS.					
B. Land	11,850	..	..	11,626	
C. Works	7,198	..	..	7,198	Completed.
K. Buildings	48,189	..	..	48,187	Do.
O. Miscellaneous	5,304	..	..	5,304	Do.
Total ..	72,541	..	..	72,315	
EASTERN SECTION.					
[This report was received on the 24th April 1890.]					
(2) MAIN CANALS AND BRANCHES.					
Main Canal.					
D. Regulators	12,538	..	..	12,538	Completed.
I. Navigation works	1,247	..	..	1,247	Do.
L. Earthwork	25,394	..	..	25,394	Do.
Bank Canal.					
B. Land	5,857	..	..	5,857	
F (1). Other cross drainage works.	7,409	..	..	7,410	Completed.
H. Escapes	3,188	..	..	3,188	Do.
I. Navigation works	1,24,747	..	..	1,24,747	Do.
L. Earthwork	1,45,178	..	..	1,45,178	Do.
Cocanada Canal.					
B. Land	2,000	..	..	1,812	Compensation paid for 77·91 acres.
F (1). Other cross drainage works.	6,666	..	..	6,666	Completed.
I. Navigation works	1,25,355	..	..	1,25,355	Do.
L. Earthwork	37,887	..	..	37,887	Do.
O. Miscellaneous	2,500	..	..	..	
Sámalkót Canal.					
B. Land	854	..	..	854	
G. Bridges	17,599	..	..	17,599	Completed.
H. Escapes	4,073	..	..	4,073	Do.
I. Navigation works	4,009	..	..	4,009	Do.
L. Earthwork	88,143	..	..	88,143	Do.
Mundapetta Canal.					
I. Navigation works	22,983	..	..	22,983	Completed.
L. Earthwork	12,700	..	..	12,700	Do.
O. Miscellaneous	1,207	..	..	1,207	Do.
Coringa Canal.					
B. Land	250	..	..	236	
F (1). Other cross drainage works.	1,521	..	..	1,520	Completed.
I. Navigation works	11,911	..	..	11,911	Do.
L. Earthwork	34,667	..	..	34,667	Do.
O. Miscellaneous	1,305	..	..	1,305	Do.
Injeram Canal.					
H. Escapes	6,708	..	..	6,708	Completed.
I. Navigation works	1,296	..	..	1,296	Do.
L. Earthwork	9,442	..	..	9,442	Do.

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
(3) DISTRIBUTARIES.	RS.	RS.	RS.	RS.	
Bank Canal.					
B. Land	1,800	920	430	644	
C. Works	11,318	1,000	1,446	11,042	Completed.
L. Earthwork	5,984	..	..	4,413	Completed, except side channel from Teki sluice.
Cocanada Canal.					
B. Land	2,100	..	..	2,033	
C. Works	25,638	..	..	25,638	Completed.
L. Earthwork	13,739	..	..	13,499	Do.
O. Miscellaneous	326	..	..	326	Do.
Sámalkót Canal.					
B. Land	2,080	..	..	2,080	Compensation paid for 36·54 acres.
C. Works	18,079	..	..	18,079	Completed.
L. Earthwork	16,721	..	..	16,721	Do.
Mundapetta Canal.					
B. Land	3,290	..	..	2,861	
C. Works	13,636	..	..	13,636	Completed.
L. Earthwork	8,317	..	..	8,316	Do.
Coringa Canal.					
B. Land	2,025	..	..	2,025	
C. Works	21,640	..	— 48	21,225	Completed.
L. Earthwork	11,392	..	..	10,412	Do.
Injeram Canal.					
B. Land	8,000	..	..	5,173	
C. Works	9,292	..	..	9,292	Completed.
L. Earthwork	9,388	..	..	9,388	Do.
Kovur-Munjair Junction Canal.					
C. Works	3,133	..	..	3,133	Completed.
L. Earthwork	12,836	..	..	12,836	Do.
(4) DRAINAGE AND PROTECTIVE WORKS.					
Mundapetta Canal.					
L. Earthwork	342	..	..	342	Completed.
Coringa Canal.					
L. Earthwork	165	..	..	165	Completed.
Tooliabaga Drain.					
B. Land	12,368	..	..	10,312	
C. Works	17,310	..	..	17,310	Completed.
L. Earthwork	1,05,213	..	..	1,05,213	Do.
Biccavole Drain.					
B. Land	3,594	..	..	3,594	
C. Works	8,263	..	..	8,263	Completed.
L. Earthwork	57,785	..	..	54,310	Do.
Takee Drain.					
B. Land	12,897	..	..	5,791	
C. Works	15,137	..	1	14,853	Completed.
L. Earthwork	1,89,629	..	..	1,89,629	Do.
Bank Canal.					
L. Earthwork	2,809	..	2	2,543	Completed.
Bheemacrosupalem Drain.					
L. Earthwork	2,270	..	..	2,270	Completed.
Cocanada Canal.					
L. Earthwork	3,340	..	..	2,303	Completed.
Total, Eastern Section ..	13,50,490	1,920	1,831	13,25,602	

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
CENTRAL SECTION.					
[This report was received on the 1st May 1890.]					
(2) MAIN CANALS AND BRANCHES.					
Main Canal.					
D. Regulators	13,348	..	..	13,348	Completed.
I. Navigation works	29,243	17,000	17,306	29,227	Bobberlanka new head lock almost completed.
L. Earthwork	37,800	100	44	35,042	Completed.
Gunnaram Canal.					
B. Land	2,310	100	348	2,052	
D. Regulators	924	..	..	924	Completed.
F. River and hill torrent works ..	26,258	..	..	26,258	Do.
G. Bridges	972	..	..	972	Do.
H. Escapes	5,882	..	—98	5,839	Do.
I. Navigation works	1,33,298	1,290	1,932	1,33,855	Do.
L. Earthwork	1,17,570	2,000	1,988	93,741	Do.
Bank Canal.					
B. Land	1,090	500	318	1,491	
F. River and hill torrent works ..	10,530	..	..	10,530	Completed.
F (1). Other cross drainage works.	4,264	..	— 45	4,257	Do.
G. Bridges	395	..	..	395	Do.
H. Escapes	620	..	..	619	Do.
I. Navigation works	83,614	..	..	83,598	Do.
L. Earthwork	53,320	4,000	3,990	51,723	Do.
Amalápur Canal.					
B. Land	120	100	..	67	
H. Escapes	13,906	..	..	13,906	Completed.
I. Navigation works	48,881	..	— 11	49,056	Do.
L. Earthwork	87,150	412	411	87,094	Do.
Bendamurlanka Canal.					
B. Land	120	120	..	..	
D. Regulators	1,300	138	— 325	1,994	Indupalli weir improvements completed.
K. Buildings..	1,000	..	28	28	
L. Earthwork	900	— 800	— 679	933	Completed.
H. Escapes	2,500	..	..	..	
O. Miscellaneous	620	..	635	635	
(3) DISTRIBUTARIES.					
Main Canal.					
C. Works	592	..	..	592	Completed.
Gunnaram Canal.					
C. Works	16,754	2,000	784	15,087	
L. Earthwork	5,896	500	451	1,953	
Bank Canal.					
C. Works	7,505	3,500	4,230	6,844	
L. Earthwork	7,410	3,410	2,418	3,091	
Amalápur Canal.					
C. Works	12,134	4,500	4,075	8,421	
L. Earthwork	5,410	1,000	295	295	
Bendamurlanka Canal.					
B. Land	130	130	..	..	
C. Works	10,680	3,150	1,678	2,267	
L. Earthwork	1,000	350	..	..	

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
(4) DRAINAGE AND PROTECTIVE WORKS.					
B. Land	6,255	995	210	2,093	
C. Works	3,450	2,100	2,178	3,825	
L. Earthwork	1,33,304	505	374	1,32,135	
Total, Central Section ..	8,88,455	47,100	42,535	8,24,187	
WESTERN SECTION.					
[This report was received on the 24th April 1890.]					
(2) MAIN CANALS AND BRANCHES.					
Main Canal.					
D. Regulators	14,861	..	..	14,861	Completed.
B. Land	1,308	..	..	1,308	Do.
I. Navigation works	1,439	..	..	1,439	Do.
L. Earthwork	36,509	..	..	36,509	Do.
Kakaraparru Canal.					
B. Land	2,692	..	..	2,692	Completed.
F (1). Other cross drainage works.	15,954	..	..	15,954	Do.
L. Earthwork	24,528	..	..	24,528	Do.
Gostanadi and Velpur Canal.					
B. Land	4,926	..	..	4,926	Completed.
E. Falls and weirs	5,580	..	..	5,580	Do.
H. Escapes	3,151	..	..	3,151	Do.
I. Navigation works	38,279	..	..	38,279	Do.
L. Earthwork	55,875	..	..	55,875	Do.
O. Miscellaneous	115	..	..	115	Do.
Gostanadi and Velpur Canal Extension.					
B. Land	2,814	..	..	2,814	Completed.
F (1). Other cross drainage works.	3,258	..	..	3,258	Do.
G. Bridges	8,798	..	..	8,798	Do.
I. Navigation works	43,593	..	..	43,593	Do.
L. Earthwork	16,927	..	..	16,927	Do.
Bank Canal.					
B. Land	3,810	..	..	3,810	Completed.
H. Escapes	7,314	..	..	7,314	Do.
I. Navigation works	94,709	..	..	94,709	Do.
L. Earthwork	27,589	..	..	27,589	Do.
Narsápur Canal.					
B. Land	1,242	..	..	1,242	Completed.
F (1). Other cross drainage works.	7,236	..	..	7,236	Do.
H. Escapes	2,664	..	..	2,664	Do.
I. Navigation works	1,56,488	..	..	1,56,487	Do.
L. Earthwork	19,628	..	..	19,628	Do.
Ellore Canal.					
B. Land	909	..	..	909	Completed.
F. River and hill torrent works ..	13,664	..	..	13,664	Do.
H. Escapes	10,493	..	..	10,493	Do.
I. Navigation works	2,622	..	..	2,622	Do.
L. Earthwork	48,991	..	..	48,991	Do.
F (1). Other cross drainage works.	792	..	..	792	Do.
Attili Canal.					
B. Land	2,091	..	..	2,091	Completed.
H. Escapes	3,461	..	..	3,461	Do.
I. Navigation works	34,000	..	..	34,000	Do.
L. Earthwork	17,504	..	..	17,504	Do.

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
Junction Canal.					
B. Land	248	..	..	248	Completed.
H. Escapes	11,697	..	..	11,697	Do.
I. Navigation works	41,529	..	..	41,529	Do.
L. Earthwork	21,820	..	..	21,820	Do.
Venkia and Weyeru Canal.					
H. Escapes	1,565	..	..	1,565	Completed.
I. Navigation works	4,179	..	..	4,179	Do.
Undi Canal.					
B. Land	1,550	..	..	1,550	Completed.
D. Regulators	2,047	..	..	2,047	Do.
H. Escapes	6,118	..	..	6,118	Do.
I. Navigation works	34,971	..	..	34,972	Do.
L. Earthwork	25,012	..	..	25,011	Do.
(3) DISTRIBUTARIES.					
Kakaraparru Canal.					
B. Land	540	..	7	214	Completed.
C. Works	9,715	..	..	9,714	Do.
L. Earthwork	3,169	..	..	3,169	Do.
Gostanadi and Velpur Canal.					
B. Land	1,226	..	..	1,225	Completed.
C. Works	17,351	..	..	17,351	Do.
L. Earthwork	2,848	..	..	2,848	Do.
Gostanadi and Velpur Canal Extension.					
C. Works	2,320	..	..	2,320	Completed.
Bank Canal.					
B. Land	1,050	..	38	512	Completed.
C. Works	7,460	..	..	7,459	Do.
L. Earthwork	8,311	4	4	8,240	Do.
Narsápur Canal.					
B. Land	1,156	..	..	1,156	Completed.
C. Works	22,109	..	..	22,109	Do.
L. Earthwork	11,617	..	..	11,617	Do.
Ellore Canal.					
B. Land	4,994	..	..	4,994	Completed.
C. Works	56,960	..	..	56,960	Do.
L. Earthwork	48,528	..	..	48,528	Do.
O. Miscellaneous	771	..	..	771	Do.
Attili Canal.					
C. Works	10,705	..	..	10,705	Completed.
L. Earthwork	12,646	..	..	12,646	Do.
Venkia and Weyeru Canal.					
B. Land	500	..	33	268	
C. Works	28,363	9,657	8,954	26,647	Eighteen sluices, two under-tunnels, seven concrete sluices and three dams completed. One under-tunnel and two dams in progress.
L. Earthwork	8,957	1,100	1,130	8,987	Completed.
Undi Canal.					
B. Land	1,240	..	..	1,240	Completed.
C. Works	27,140	117	321	26,956	Do.
L. Earthwork	28,580	..	100	28,664	Do.

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
(4) DRAINAGE AND PROTECTIVE WORKS.					
Ellore Canal.					
B. Land	2,536	..	..	2,536	Completed.
C. Works	23,653	..	..	23,653	Do.
L. Earthwork	66,159	..	..	66,159	Do.
Attili Canal.					
C. Works	689	..	..	689	Completed.
Undi Canal.					
C. Works	4,373	659	497	4,286	Completed.
L. Earthwork	3,398	100	..	3,398	Do.
Nakkala Drain.					
B. Land	403	..	..	403	Completed.
C. Works	29,479	..	..	29,479	Do.
L. Earthwork	1,976	..	..	1,976	Do.
Mogultur Drain.					
B. Land	1,063	..	..	1,063	Compensation paid for 57·43 acres.
C. Works	2,363	..	..	2,363	Completed.
L. Earthwork	20,646	..	..	20,646	Do.
Gonter Drain.					
B. Land	2,000	..	..	1,871	Compensation paid for 54·30 acres.
L. Earthwork	22,251	..	..	22,251	Completed.
Yennamaduru Drain.					
C. Works	13,220	..	..	13,220	Completed.
L. Earthwork	13,747	..	..	13,747	Do.
Minor Drains.					
B. Land	1,636	..	..	1,635	Compensation paid for 10·24 acres.
C. Works	6,625	..	..	6,625	Completed.
L. Earthwork	45,276	..	..	45,275	Do.
Compensation for various canals ..	— 108	..	..	— 108	
Total, Western Section ..	14,66,191	11,637	11,084	14,63,016	
Unforeseen expenses ..	85,296	..	..	..	
Total, Godávari Delta System ..	81,62,045	60,657	55,450	79,84,192	
KISTNA DELTA SYSTEM.					
Old outlay	30,81,755	..	..	30,81,755	
(1) HEAD WORKS.					
B. Land	3,417	..	..	3,079	
C. Works	1,27,429	6,300	5,602	29,539	The Bezváda side under-sluices were fitted up with screw-gearing shutters. Wall along river bank below anicut completed. Fifteen screw-gearing shutters for the Sitanagaram under-sluices under preparation and five dam stones supplied. Opening made in all the arches for the groves for Seetanagaram under-sluices.
K. Buildings	81,567	25,909	27,572	77,283	All buildings previously sanctioned completed. The Executive Engineer and Assistant Engineer's quarters and out-houses almost finished. Walls of Executive Engineer's office have been raised 5 feet above floor level.
Total ..	2,12,413	32,209	33,174	1,09,901	

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
EASTERN SECTION.	RS.	RS.	RS.	RS.	
[The report of the Eastern Section was received on the 9th May 1890, and that of the Gudiváda division on the 6th May 1890.]					
(2) MAIN CANALS AND BRANCHES.					
Main Canal.					
B. Land	5,188	..	..	5,188	Completed.
D. Regulators	14,344	..	..	14,344	Do.
G. Bridges	1,550	..	..	1,260	
I. Navigation works	7,844	..	..	7,844	Do.
L. Earthwork	1,04,962	..	..	1,04,961	Do.
Ellore Canal.					
F. River and hill torrent works ..	1,07,240	33,545	31,072	1,04,920	Chataparru outlet and Tamileru aqueduct improvements completed except railings and coping. All inlets completed and outlets, except those at 3 miles, 32-29, 32-30, 34-40.
I. Navigation works	885	..	..	..	
F (1). Other cross drainage works.	2,430	..	..	..	
O. Miscellaneous	4,265	1,138	396	1,826	Wutlur crossing completed.
G. Bridges	10,500	3,467	1,226	1,226	Excavating foundations in progress. Materials to the value of Rs. 1,000 collected at site.
L. Earthwork	..	1,500	1,508	1,508	Banks raised in low places.
Ryves' Canal.					
B. Land	10,070	..	..	9,921	
D. Regulators	20,884	..	..	20,541	Completed.
E. Falls and weirs	5,815	..	..	5,815	Do.
F (1). Other cross drainage works.	5,599	..	..	5,598	Do.
G. Bridges	30,507	..	..	30,506	Do.
K. Buildings	2,853	..	..	2,853	Do.
L. Earthwork	3,81,572	160	156	3,74,733	Banks raised or sectioned in low places in 3rd reach.
O. Miscellaneous	1,641	..	..	1,641	Completed.
Masulipatam Canal.					
B. Land	5,950	4,072	..	1,878	Completed.
F (1). Other cross drainage works.	22,994	..	..	22,994	Do.
I. Navigation works	1,872	..	..	1,780	Do.
L. Earthwork	2,70,661	12,002	9,519	1,50,200	From head to off-take of Bank canal excavated to 80-feet bottom width.
O. Miscellaneous	5,506	582	614	4,865	Three cattle-crossings completed and two in progress.
Pamarru Canal.					
B. Land	92	..	..	92	Completed.
G. Bridges	3,850	..	—65	3,528	Bridge over junction canal completed.
Bank Canal.					
B. Land	10,257	1,300	1,363	12,514	
D. Regulators	6,940	840	821	9,276	Head-sluice completed.
F. River and hill torrent works ..	3,58,500	..	..	..	
F (1). Other cross drainage works.	6,650	..	..	..	
G. Bridges	44,650	..	..	..	
H. Escapes	5,830	..	..	..	
I. Navigation works	17,195	10,195	10,638	18,840	Lock at head completed except fitting the gates and culvert shutters.
K. Buildings	8,460	..	..	..	
L. Earthwork	3,35,555	17,072	17,551	90,122	First reach excavated to 20-feet bottom width.
O. Miscellaneous	9,665	..	..	87	
P. Maintenance	32,000	..	..	..	
Pulleru Canal.					
B. Land	6,775	4	4	5,469	
D. Regulators	6,668	..	..	6,668	Completed.
E. Falls and weirs	6,373	..	..	6,373	Do.
L. Earthwork	90,748	43	43	90,007	Do.
O. Miscellaneous	6,459	50	50	3,559	Gopuvanipalem, Kanumur, Pedakuru Madali, Gavindlagudem, Kondiparu, Pasumarru, Mamidikolla and Chitram channel ramps completed.

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
Polraz Canal.					
B. Land	5,517	..	..	2,279	
D. Regulators	3,320	900	918	3,963	Improvements to canal head-sluice completed.
I. Navigation works	80,897	713	709	79,517	Head lock, lock establishment quarters, surplus weir, channel, Vinjeram and Tadinada locks and lock weirs and surplus weir at Tadinada completed.
K. Buildings	2,031	..	..	2,031	Completed.
L. Earthwork	50,207	13,200	12,692	50,581	Widening and extension of the canal, as also widening from head to 7 miles 56 chains completed.
O. Miscellaneous	7,275	20	26	6,553	Nine ramps completed and demarcation stones collected for fixing from head to 7¼ miles along the line of the south side channel.
H. Escapes	1,932	..	..	1,932	Completed.
Bantumilli Canal.					
A. Preliminary expenses	100	..	74	74	Surveying and levelling operations along Bantumilli canal extension completed.
B. Land	339	..	..	309	
D. Regulators	785	..	..	785	Completed.
G. Bridges	6,190	..	..	..	
H. Escapes	6,460	..	..	..	
I. Navigation works	54,985	145	145	27,036	Kamalápuram lock, the lock weir and improvements to the head lock completed.
K. Buildings	4,549	..	..	2,679	Rest-house at Cowtaram completed.
L. Earthwork	43,375	..	..	5,936	Raising banks of canal in first reach completed.
O. Miscellaneous	3,230	..	..	..	
(3) DISTRIBUTARIES.					
Ellore Canal.					
B. Land	9,831	..	..	179	
C. Works	20,937	482	— 504	3,594	Materials being collected.
L. Earthwork	24,807	..	..	2,782	Mupparru channel completed.
O. Miscellaneous	766	..	..	767	Completed.
Ryves' Canal.					
B. Land	13,303	1,451	1,363	7,858	
C. Works	35,594	3,591	4,158	27,608	Seven head-sluices, five drops, one drop bridge, one escape and improvements to one head-sluice and one bridge completed. Materials for twelve minor sluices, one drop, one road dam and two head-sluices under collection.
L. Earthwork	65,218	1,491	1,164	55,012	Extension and widening of Dosapad channel, improving Kunderu channel, excavating Komatigunta channel, Neharallikodu, North Side channel, Kalavapamula and Juvvanapudi branch channels completed.
O. Miscellaneous	4,826	951	727	3,638	Seven ramps on Dosapad channel completed, two nearly so, and materials for three under collection.
Masulipatam Canal.					
B. Land	9,225	4,500	..	1,725	
C. Works	17,889	..	..	10,389	Old expenditure on west side channel.
L. Earthwork	56,919	..	..	38,920	Do. do. do.
O. Miscellaneous	1,500	..	..	..	
Bank Canal.					
B. Land	21,017	...	..	..	
C. Works	48,585	..	..	..	
L. Earthwork	1,16,615	..	..	..	
Pulleru Canal.					
B. Land	31,223	541	420	9,535	
C. Works	87,412	2,805	2,377	23,994	Surplus weir, skew-arched bridge, seven head-sluices, four sluices, one drop and two regulators completed, as also improvements to a weir. Materials under collection for two head-sluices, three drops and six sluices.

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
Pulleru Canal—cont.	RS.	RS.	RS.	RS.	
L. Earthwork	1,76,615	861	900	48,038	Gudiváda channel, Bantumilli south side channel, Kodúr new head, Chintalakodu, Tativarrukodu, Isakaparrakodu, Peddapalaparru channel, North side channel, Mudunur channel, Motur channel, Motur channel extension, and new head to Sayarazulankakodu completed.
O. Miscellaneous	19,342	262	— 665	4,662	Seven ramps completed and four ramps abandoned, and materials for these latter have been transferred to other works; revetting present tail escape and demarcation of Kapileswaram channel completed.
Polraz Canal.					
A. Preliminary expenses ..	408	..	..	408	Completed.
B. Land	6,520	1,147	1,176	2,377	
C. Works	43,064	14,238	12,848	22,238	Six head-sluices, two regulators and the eight sluices of Polraz canal south side channel completed. Materials under collection for nine bridges and sixteen masonry works.
L. Earthwork	65,250	18,141	20,895	58,019	Excavating Polraz canal south side channel, Tadinada channel, Korukollu branch, Chigurukota, Ramavaram, Sitanapalli, Narsayapollem and Rudravaram side channels completed; Polraz canal north side channel and Pedakomileru north and south side channels almost completed.
O. Miscellaneous	1,560	100	..	..	Demarcation stones for fixing under collection.
Bantumilli Canal.					
A. Preliminary expenses ..	295	..	..	295	Completed.
B. Land	4,056	..	..	405	
C. Works	14,733	1,300	1,842	1,842	Materials collected for head-sluice to Bantumilli canal main distributary and head-sluice to left side channel of Bantumilli canal at 2 miles 2,960 feet; foundations dug and concrete laid.
L. Earthwork	17,986	6,000	6,885	6,885	Work or excavating Bantumilli canal main distributary carried out in all the miles except 11th and 11th miles.
O. Miscellaneous	485	..	1	1	
(4) DRAINAGE AND PROTECTIVE WORKS.					
Pulleru Canal.					
B. Land	519	..	..	..	
L. Earthwork	2,860	1,500	1,239	1,239	Work in progress.
Ellore Canal.					
B. Land	2,538	..	..	..	
L. Earthwork	34,080	..	..	15,845	Widening Budemeru drain completed.
O. Miscellaneous	10,120	..	..	..	
Ryves' Canal.					
B. Land	457	..	..	..	
C. Works	721	174	169	716	Completed.
L. Earthwork	1,171	..	..	..	
Drainage along the left bank of Masulipatam Canal.					
B. Land	607	..	..	607	
L. Earthwork	931	..	..	931	
O. Miscellaneous	58	..	..	54	
Sivaganga Drain.					
B. Land	211	..	..	210	
Kanikala Main Drain.					
B. Land	1,908	..	..	..	
C. Works	2,725	..	..	..	
L. Earthwork	14,687	..	..	..	
Devarayapalli Drain.					
L. Earthwork	333	..	..	..	

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
Taloru (Divi) Drain.					
B. Land	1,333	..	..	..	
C. Works	2,500	..	..	..	
L. Earthwork	16,667	..	..	..	
Gudermotu (Divi) Drain.					
B. Land	667	..	..	..	
C. Works	3,166	..	..	..	
L. Earthwork	4,500	..	..	..	
Mopedevi Drain.					
L. Earthwork	167	..	..	..	
Lingala Drain.					
B. Land	476	..	..	476	
L. Earthwork	3,052	..	..	3,052	Completed.
O. Miscellaneous	1,099	..	..	..	
Uppuluru Drain.					
B. Land	1,033	..	..	1,033	
C. Works	6,717	..	..	..	
L. Earthwork	12,968	..	..	8,499	Completed.
O. Miscellaneous	261	..	..	..	
Chendrayakodu Drain.					
B. Land	19,740	..	..	3,869	
C. Works	23,805	325	165	18,635	Culvert under the Ryves' canal except coping and the bridge on the Argole road completed.
L. Earthwork	82,763	6,000	6,052	52,049	Excavating Chendraya drain completed except a little widening in 16th mile.
O. Miscellaneous	3,119	..	..	..	
Polrazukodu Drain.					
B. Land	23,830	187	93	1,546	One bridge completed. One culvert in progress.
C. Works	28,731	1,030	870	7,215	One bridge completed and another completed except coping.
L. Earthwork	90,042	5,077	5,005	63,819	Excavating main drain, Komaravolu and Palakodu affluents completed. Widening Polraz drain completed except in 5 furlongs.
O. Miscellaneous	2,093	483	610	1,479	Materials collected for crossings along Polraz drain.
Kolleru Embankment.					
B. Land	904	..	..	..	
L. Earthwork	17,935	..	..	..	
Polraz Canal.					
B. Land	150	..	..	..	
L. Earthwork	3,505	..	..	..	
Pullava Main Drain and Affluents.					
B. Land	850	..	..	385	
C. Works	2,505	..	..	..	
L. Earthwork	24,445	..	..	24,444	Completed.
O. Miscellaneous	1,291	19	148	148	Materials for crossings under collection.
Damidi Drain.					
B. Land	220	..	..	97	
C. Works	1,865	..	..	..	
L. Earthwork	5,107	..	..	5,106	Completed.
O. Miscellaneous	518	..	4	197	Materials under collection.
Pedākomileru Drain and Affluents.					
B. Land	2,200	620	492	607	
C. Works	3,762	..	..	..	
L. Earthwork	60,529	11,000	11,096	53,809	Widening Pedakomileru drain to tentative width completed, except from 5 to 8 miles Lingala or Chinnakomileru affluent completed.
O. Miscellaneous	2,935	690	1,008	1,976	Almost all materials collected for the crossings, and foundations dug for three ramps.
Peddalanka Main Drain and Affluents.					
B. Land	3,410	50	..	120	
C. Works	945	..	..	..	
L. Earthwork	84,090	12,647	13,790	53,949	Completed to a width of 55 feet to the junction of Kalidindikodu.
O. Miscellaneous	415	..	..	..	

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
Luzzabanda Drain.	RS.	RS.	RS.	RS.	
B. Land	18,975	..	..	3,547	
C. Works	40,612	..	—530	9,899	Bridge on Vadlamanad affluent nearly completed.
L. Earthwork	1,54,770	7,030	6,076	90,079	Nearly completed to the extent to which detailed estimates have been sanctioned.
O. Miscellaneous	7,618	405	392	1,351	Demarcating Luzzabanda drain and Vadlamanad affluent and fixing guage posts along them have been worked out.
Saradayapet Drain.					
B. Land	1,600	..	..	1,600	Completed.
Sultanagram Drain.					
B. Land	601	..	..	189	
L. Earthwork	2,415	..	..	..	
Kanakavalli Drain.					
A. Preliminary expenses ..	300	..			
B. Land	2,720	..	..	..	
C. Works	6,000	..	..	..	
L. Earthwork	14,009	..	..	..	
O. Miscellaneous	4,432	..	..	..	
Gúdur Swamp Minor Channels.					
B. Land	375	..	..	..	
C. Works	1,500	..	..	..	
L. Earthwork	5,625	..	..	..	
Drain for Inampudi Aqueduct to Dayapucalva.					
B. Land	5,710	..	..	..	
L. Earthwork	51,610	11,371	11,189	40,312	Completed except the first 5 miles of the drain.
O. Miscellaneous	660	300	311	311	Materials have been carted to site for fixing mile and demarcation stones.
Total, Eastern Section ..	41,08,740	2,17,717	2,01,226	21,07,182	
WESTERN SECTION.					
[This report was received on the 24th April 1890.]					
(2) MAIN CANALS AND BRANCHES.					
Main Canal.					
B. Land	10,870	200	7	7,876	Schedules for the remaining land required submitted.
D. Regulators..	15,702	..	..	15,702	Completed.
I. Navigation works	212	..	..	212	Do.
L. Earthwork	5,21,272	34,000	40,674	2,94,728	In steady progress throughout.
F. River and hill torrent works..	465	..	..	465	Completed.
H. Escapes	2,124	..	..	2,124	Do.
O. Miscellaneous	1,243	..	..	879	Fixing demarcation stones very nearly finished.
G. Bridges	610	..	..	..	
Bank Canal.					
B. Land	2,050	..	..	364	
D. Regulator	3,390	..	..	..	
F (1). Other cross drainage works.	7,275	..	..	..	
H. Escapes	2,865	..	..	..	
I. Navigation works	1,01,595	9,000	11,258	61,627	Kollur and Vellatur locks completed. Mortata lock nearly completed.
K. Buildings	5,342	..	..	5,342	Completed.
L. Earthwork	1,13,715	12,000	10,129	49,971	Work in the 18th and 25th miles in progress.
O. Miscellaneous	9,951	2,780	2,149	2,350	
Nizampatam Canal.					
I. Navigation works	629	..	..	628	Completed.
L. Earthwork	10,645	..	..	..	
G. Bridges	19,485	..	..	11,095	Tenali bridge completed.
Commamur Canal.					
B. Land	16,068	500	384	13,070	Nearly all the compensation schedules have now been submitted.
D. Regulators	2,593	..	..	2,593	Completed.

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
Commamur Canal—cont.					
F. River and hill torrent works ..	2,43,727	7,461	4,788	1,61,521	Karenchedu outlet, Karenchedu aqueduct, improvements to Nallámada Parchur vagu surplus sluices, Swerna outlet and aqueduct, Appapuram outlet and Saki aqueduct completed. Moorkondapad outlet nearly completed. Nallámada outlet completed.
G. Bridges	44,183	2,980	2,555	45,897	Completed.
I. Navigation works	1,40,078	..	..	1,37,697	Do.
K. Buildings	3,928	..	..	3,927	Do.
L. Earthwork	3,07,055	13,000	15,576	1,50,195	Widening first reach to ultimate bed width in progress.
O. Miscellaneous	10,562	3,812	2,112	6,435	Cattle-crossings at Vadlamudi and Kunkalamaru completed. Materials collected for cattle-crossing at Duggirala. Santaravur crossing almost completed.
(3) DISTRIBUTARIES.					
Bank Canal.					
A. Preliminary expenses ..	77	..	26	26	
B. Land	7,478	..	..	459	
C. Works	53,889	..	4	1,318	Head-sluice to Chivalur channel completed, and materials under collection for Kuchinapudi channel head-sluice.
L. Earthwork	81,254	..	..	5,461	Excavation of Chidalur channel almost completed, and extension of Peteru and Kollipara channels in progress.
Nizampatam Canal.					
C. Works	8,702	..	..	3,572	
L. Earthwork	8,787	..	..	6,732	
Commamur Canal.					
A. Preliminary expenses ..	360	..	..	132	
B. Land	19,552	500	246	4,724	
C. Works	58,177	2,562	1,697	21,513	Works on Budam and Moorkondapad channels completed. Head-sluices to Jagarlamudi, Karenchedu and Santaravur side channels also completed. Works on Srirangapuram channel nearly completed.
L. Earthwork	1,50,039	1,400	1,019	65,998	Budam and Moorkondapad channels completed. Jagarlamudi channel completed for 3 miles and 6 furlongs from the head. Santaravur side channel completed and Jubidi channel nearly so. Oliveru branch channel and Penugudurupad east side channel also completed. Excavation of main channel of Srirangapuram channel project nearly completed.
O. Miscellaneous	3,475	600	268	268	
(4) DRAINAGE AND PROTECTIVE WORKS.					
Drainage Channel from Emileru to Feringidibba.					
B. Land	900	..	..	891	
L. Earthwork	9,528	..	..	5,403	The drain to a bottom width of 50 feet has been completed.
Répalle Main Drain and Affluents.					
B. Land	21,071	..	29	2,702	
C. Works	42,267	4,337	3,945	36,102	Pudivada bridge nearly completed.
L. Earthwork	1,75,457	2,246	1,495	1,21,587	Excavation of Répalle main drain nearly completed.
O. Miscellaneous	5,140	1,433	799	3,828	Demarcation stones being fixed.
Bhattiprolu Main Drain.					
C. Works	15,601	9,958	9,213	12,384	Foundations of aqueduct to carry Iskapalle channel over Bhattiprolu drain completed.
L. Earthwork	28,166	..	..	..	
O. Miscellaneous	2,439	..	..	..	
Peddapalle Drain.					
B. Land	96	..	..	96	Completed.
L. Earthwork	1,930	..	..	1,930	Do.
Nizampatam Drain.					
B. Land	3,350	..	..	..	
C. Works	6,740	..	..	..	
L. Earthwork	6,801	..	..	..	
Tungabhadra Drain and Affluents.					
B. Land	17,172	1,000	677	1,864	
C. Works	99,794	..	..	..	
L. Earthwork	4,92,153	53,000	55,747	1,22,129	Tungabhadra drain nearly completed and Nallamada affluent in progress.
O. Miscellaneous	6,152	500	478	735	

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
Romperu Drain and Affluents.	RS.	RS.	RS.	RS.	
B. Land	2,593	..	41	824	
L. Earthwork	1,79,739	1,000	81	44,919	
Total, Western Section ..	31,06,513	1,64,269	1,65,397	14,40,295	Karenchedu drain fully completed for one and half miles.' Excavating Sakikalva affluent is almost completed.
Unforeseen expenses ..	2,21,573	..	..	..	
Total, Kistna Delta ..	1,07,30,994	4,14,195	3,99,797	67,39,133	
PENNÉR ANICUT SYSTEM.					
[This report was received on the 28th April 1890.]					
Old outlay	5,26,117	..	..	5,26,117	
(1) HEAD WORKS.					
C. Works	1,43,751	..	..	1,43,751	Completed.
(2) MAIN CANALS AND BRANCHES.					
Main Canal.					
B. Land	428	..	..	428	Completed.
D. Regulators	17,708	..	..	17,708	Do.
L. Earthwork	7,403	..	..	7,403	Do.
Jaffer Sahib's Canal.					
D. Regulators	6,786	..	..	6,786	Completed.
Kistnapatam Canal.					
D. Regulators	1,189	..	..	1,189	Completed.
G. Bridges	741	..	..	741	Do.
L. Earthwork	824	..	..	824	Do.
Sarvapalli Canal.					
A. Preliminary expenses ..	315	..	..	315	Completed.
B. Land	3,912	..	5	3,787	
D. Regulators	2,657	..	..	2,657	Completed.
G. Bridges	25,682	..	..	25,683	Do.
H. Escapes	13,746	..	..	13,746	Do.
L. Earthwork	87,171	7,800	7,509	87,718	Do.
O. Miscellaneous	5,620	..	..	5,620	Do.
(2-A) TANK AND RESERVOIRS.					
Nellore Tank.					
B. Land	500	200	11	165	Completed.
C. Works	37,472	..	..	37,497	Do.
L. Earthwork	29,026	460	407	33,059	Do.
O. Miscellaneous	265	249	122	128	Do.
(3) DISTRIBUTARIES.					
Sarvapalli Canal.					
B. Land	29,074	..	— 90	29,074	Completed.
C. Works	66,069	..	..	66,069	Do.
L. Earthwork	1,18,597	..	..	1,18,597	Do.
N. Tanks and reservoirs ..	1,10,316	21	21	1,09,873	Do.
Jaffer Sahib's Canal.					
C. Works	1,276	..	..	1,207	Completed.
(4) DRAINAGES AND PROTECTIVE WORKS.					
B. Land	300	100	100	269	Completed.
L. Earthwork	43,968	1,994	1,755	39,160	Do. but not fully paid.
Total ..	12,80,913	10,824	9,840	12,79,571	
Unforeseen expenses ..	12,909	..	..	..	
Total, Pennér Anicut System ..	12,93,822	10,824	9,840	12,79,571	
SANGAM PROJECT.					
[This report was received on the 28th April 1890.]					
(1) HEAD WORKS.					
A. Preliminary expenses ..	51,130	..	..	51,130	Completed
B. Land	18,562	..	1	18,223	Do.
C. Works	5,91,255	..	..	5,91,255	Do.
K. Buildings	21,026	..	..	21,026	Do.
O. Miscellaneous	32,502	..	..	32,501	Do.
P. Maintenance	4,105	..	..	4,105	Do.

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
(2) MAIN CANALS AND BRANCHES.					
Kanigiri Canal.					
B. Land	2,63,261	8,000	1,233	2,39,894	
D. Regulators	93,423	..	..	93,423	Completed.
E. Falls and weirs	24,010	..	..	24,011	Do.
G. Bridges	28,221	..	..	28,221	Do.
L. Earthwork	2,10,003	..	..	2,10,004	Do.
N. Tanks and reservoirs ..	2,86,393	— 175	— 174	2,90,426	Do.
O. Miscellaneous	13,460	367	367	13,735	Do.
P. Maintenance	22,058	..	..	22,058	Do.
Duvvuru Canal.					
D. Regulators	864	..	..	864	Completed.
N. Tanks and reservoirs ..	8,755	..	..	8,755	Do.
(3) DISTRIBUTARIES.					
Eastern Canal.					
B. Land	14,362	..	828	4,918	Completed with the exception of minor channel, 12 miles 2,906 feet, not yet begun.
C. Works	99,488	278	— 153	1,00,644	
L. Earthwork	1,59,689	2,045	540	1,60,876	
P. Maintenance	2,009	..	..	2,009	
O. Miscellaneous	5,825	651	524	4,763	
Vavilla Tank Supply Channel.					
B. Land	244	..	81	81	Completed.
C. Works	1,131	400	339	975	Do.
L. Earthwork	800	18	16	725	Do.
O. Miscellaneous	50	..	..	37	Do.
Yellayapalem Branch Channel.					
B. Land	97	..	..	..	
C. Works	3,425	..	..	3,424	Completed.
L. Earthwork	4,470	..	..	4,470	Do.
O. Miscellaneous	48	..	..	48	Do.
Varni Branch Channel.					
B. Land	267	..	50	338	
C. Works	2,554	..	..	2,554	Completed.
L. Earthwork	2,215	169	163	2,070	Do.
O. Miscellaneous	94	30	40	89	Do.
Varni Tank Supply Channel.					
B. Land	2,305	..	6	6	
C. Works	1,750	1,025	1,780	1,823	Completed.
L. Earthwork	2,385	200	1,687	2,330	Do.
N. Tanks and reservoirs ..	5,477	5,170	4,518	5,308	Do.
O. Miscellaneous	181	51	77	77	Do.
Minor Channel from Vidavalur Tank.					
B. Land	1,378	..	..	..	
C. Works	2,670	2,545	2,304	2,304	
L. Earthwork	2,270	2,160	2,099	2,099	Almost finished.
O. Miscellaneous	140	40	64	64	
Alleru Channel.					
B. Land	950	..	33	33	
C. Works	14,075	2	— 49	13,761	Completed.
L. Earthwork	2,500	250	127	2,570	Do.
O. Miscellaneous	280	6	6	257	Nearly completed.
Purini Tank Supply Channel.					
B. Land	190	..	5	5	
C. Works	1,671	1,072	952	1,553	Completed.
L. Earthwork	232	200	205	205	Almost completed.
O. Miscellaneous	60	50	50	50	Completed.
Indupur Tank Supply Channel.					
C. Works	590	..	..	590	Completed.
L. Earthwork	533	..	..	533	Do.
Zuvaladinni Branch Channel.					
B. Land	1,249	..	13	826	
C. Works	6,384	4	4	6,322	Completed.
L. Earthwork	6,024	..	..	6,024	Do.
O. Miscellaneous	375	..	..	375	Do.

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
Iskapalle Branch Channel.					
B. Land	331	..	13	15	
C. Works	1,271	..	..	1,271	In progress.
L. Earthwork	3,028	53	53	3,222	Completed.
O. Miscellaneous	134	..	..	134	Do.
Channel from Vegur Tank to supply Mudigunta Tank.					
B. Land	210	..	..	48	
C. Works	862	..	..	862	
L. Earthwork	808	..	..	807	
O. Miscellaneous	72	..	..	72	
Ramanah Branch Channel.					
B. Land	82	..	8	11	
C. Works	3,891	..	..	3,892	Nearly completed.
L. Earthwork	2,574	7	7	2,530	Do.
O. Miscellaneous	51	..	..	51	Do.
Gogallapalle Branch Channel.					
B. Land	941	..	196	243	Completed, except a portion of earthwork at end of extension of channel and breaking the tank bund.
C. Works	3,294	1,115	798	2,709	
L. Earthwork	6,205	1,812	1,740	5,173	
O. Miscellaneous	547	257	213	362	
N. Tanks and Reservoirs ..	...	30	..	..	
Ulavapalle Branch Channel.					
B. Land	855	..	..	203	Completed except minor channels.
C. Works	7,408	315	43	6,473	
L. Earthwork	24,595	965	754	24,714	
O. Miscellaneous	460	247	73	161	
Alleru Branch Channel.					
B. Land	267	..	..	266	Completed.
C. Works	9,770	..	..	9,770	Do.
L. Earthwork	9,946	..	..	9,946	Do.
P. Maintenance	717	..	..	717	Do.
Channel from Alleru Tank to Ramanah Tank Channel Head Sluice.					
B. Land	..	..	— 6	..	
L. Earthwork	617	..	..	617	Completed.
O. Miscellaneous	20	4	3	3	Do.
Central Channel.					
B. Land	4,097	..	40	2,601	
C. Works	19,116	..	..	19,117	Completed.
L. Earthwork	29,425	..	..	29,426	Do.
P. Maintenance	2,748	..	..	2,748	Do.
O. Miscellaneous	1,700	..	..	1,557	Completed with the exception of one channel.
Southern Channel.					
B. Land	17,297	..	2,320	15,282	Completed, except a drop and aqueduct on minor channel 0 mile 1,363 feet. The drop is being finished, and materials for the aqueduct are under collection.
C. Works	84,950	4,187	3,628	80,781	
L. Earthwork	77,828	3,706	2,931	78,021	
P. Maintenance	3,994	..	..	3,994	
O. Miscellaneous	2,800	510	645	2,378	
Duvuru Branch Channel.					
B. Land	792	..	..	584	
C. Works	19,526	380	378	19,381	Completed.
L. Earthwork	21,138	..	..	20,782	Do.
O. Miscellaneous	1,182	271	266	1,051	Do.
(4) DRAINAGE AND PROTECTIVE WORKS.					
Velvapalla Drain.					
L. Earthwork	..	..	..	..	
Alleru Drain.					
L. Earthwork	..	..	..	..	
Embankment between Kadamitula and Zuvaladinni.					
B. Land	205	..	..	94	Completed.
C. Works	828	..	..	828	Do.
L. Earthwork	2,529	..	..	2,529	Do.
O. Miscellaneous	38	..	..	38	Do.

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
Challayapalem Drainage Channel.					
B. Land	600	..	..	451	
L. Earthwork	5,958	..	..	5,958	Completed.
O. Miscellaneous	..	..	..	..	
Drainage to Moldevi.					
B. Land	158	..	— 452	12	
L. Earthwork	853	..	..	853	Completed.
O. Miscellaneous	1,110	189	651	651	
Duvur Drainage Channel.					
O. Miscellaneous	26	..	..	26	Completed.
Drainage Channel at 7 miles of Southern Channel.					
B. Land	703	..	..	703	Completed.
L. Earthwork	562	..	..	562	Do.
Southern Channel.					
B. Land	48	..	3	3	} Nearly completed.
L. Earthwork	819	..	..	629	
O. Miscellaneous	42	..	..	..	
Mudivarti Drainage Channel.					
B. Land	212	..	..	212	
L. Earthwork	3,322	..	..	3,322	Completed.
O. Miscellaneous	300	22	13	160	Do.
Vegur Channel, Right Bank.					
B. Land	634	..	241	620	
L. Earthwork	4,025	..	..	4,025	Completed.
O. Miscellaneous	100	57	57	74	
Indupur Tank Minor Channel.					
B. Land	450	..	..	..	
C. Works	1,667	..	..	..	
L. Earthwork	1,435	..	..	..	
O. Miscellaneous	248	..	..	..	
Drainage Channel from Drainage Culvert 14 miles 1,730 feet, Eastern Channel.					
B. Land	462	..	156	164	Completed.
L. Earthwork	2,000	160	158	2,605	Do.
O. Miscellaneous	102	..	..	102	Do.
Drainage Channel from 6 miles 330 feet, Eastern Channel.					
B. Land	286	..	..	271	
L. Earthwork	936	..	..	929	Completed.
Drainage Channel from 9 miles 3,300 feet.					
B. Land	70	..	..	68	
C. Works	..	..	..	..	
L. Earthwork	356	..	..	356	Completed.
Drainage Channel from Annareddipalem Tank.					
B. Land	8	..	..	1	
L. Earthwork	1,173	..	..	1,173	Completed.
Drainage from Culvert in 11th mile of Southern Channel.					
L. Earthwork	..	..	..	36	
Unforeseen works	32,721	..	..	..	
Unappropriated balance ..	..	1,155	..	..	
Total, Sangam Project ..	24,50,000	40,000	32,726	23,64,188	
KURNOOL CANAL.					
Purchase value	2,16,41,679	..	— 966	2,16,41,679	
BARUR TANK PROJECT.					
[This report was received on the 29th May 1890.]					
(1) HEAD WORKS.					
A. Preliminary expenses ..	1,642	40	40	729	
B. Land	11,451	800	785	10,540	

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
(1) HEAD WORKS—*cont.*					
C. Works	23,860	250	238	23,687	Completed with the exception of a small gap kept open in the anicut till the completion of the new head to Agaram channel.
K. Buildings	2,752	162	126	2,716	Completed.
L. Earthwork	..	..	..	..	
O. Miscellaneous	4,900	70	80	4,880	Completed.
P. Maintenance	362	..	..	355	Do.
(2) MAIN CANALS AND BRANCHES.					
Agaram Channel.					
D. Regulators	9,030	..	..	9,030	Completed.
L. Earthwork	4,894	800	351	3,178	Rock-blasting is in progress. Earthwork completed.
Nedungal Channel.					
D. Regulators	818	..	..	818	Completed.
Barur Tank Supply Channel.					
D. Regulators	6,127	5	5	6,127	Completed.
F (1). Other cross drainage works.	4,362	150	142	4,020	Fifteen out of sixteen inlets and all the outlets completed.
G. Bridges	4,886	..	..	4,886	Completed.
L. Earthwork	75,492	100	50	75,036	Completed with the exception of a little blasting.
N. Tanks and reservoirs ..	1,879	..	..	1,880	Completed.
O. Miscellaneous	4,650	103	87	4,634	Fourteen out of fifteen distribution sluices completed.
(2-A) RESERVOIRS.					
Barur Tank.					
C. Works	2,949	..	..	2,949	Completed.
L. Earthwork	66,827	..	— 17	67,388	Do.
(3) DISTRIBUTARIES.					
C. Works	41,863	7,013	6,525	31,350	Keelcooppam east and west sluices and aqueduct, 8 inlets, 1 terminal and 29 outlets, 22 distribution sluices, 11 falls, all the tunnels and accommodation bridge and the tail channel completed. Concrete foundation to the Barur aqueduct and foundations to the other accommodation bridge completed.
L. Earthwork	48,969	16,250	16,834	47,855	West main and branch channels completed. East main branch channels with the exception of No. 4 and a small quantity of work in the 3rd and 6th miles of the main channel are nearly completed.
N. Tanks and reservoirs ..	444	57	41	428	Completed.
Total ..	3,18,157	25,800	25,287	3,02,486	
Unforeseen works ..	1,443	..	..	..	
Total, Barur Tank Project ..	3,19,600	25,800	25,287	3,02,486	
PERIYÁR PROJECT.					
[The report for No. I Division was received on the 15th April 1890 and that for No. II Division on the 2nd May 1890.]					
(1) HEAD WORKS.					
Periyár Valley.					
A. Preliminary expenses ..	79,620	..	— 51	75,355	Completed.
C. Works	12,72,115	1,83,746	1,83,750	4,00,723	Main dam.—Front wall raised to 20 except for a short length on left bank, which is at 15, rear wall to 7·50 (its full height.) Piers to enclose site on right bank completed to 15 ; 400 feet of tunnel and 2,600 feet of cutting completed. Right bank escape about one-third finished.
K. Buildings	1,41,585	30,628	30,628	1,02,786	Completed, except the main workshed and some minor buildings.
O. Miscellaneous	78,783	27,268	26,508	79,353	Completed with trifling exceptions.
P. Maintenance	50,000	2,607	3,382	3,382	

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
Surulyar Valley.	RS.	RS.	RS.	RS.	
A. Preliminary expenses ..	5,000	..	..	5,000	Not taken up and will probably not be required, much simpler and cheaper arrangements being substituted.
C. Works	3,11,020	..	..	..	
P. Maintenance	13,980	..	..	..	
(2) *Main Canals and Branches.*					
A. Preliminary expenses ..	18,142	1,389	190	18,060	
Main Channel, 1st Reach.					
B. Land	34,545	4,000	972	17,109	Practically complete.
D. Regulators	55,619	13,447	13,811	23,670	
E. Falls and weirs	6,850	1,995	1,995	5,561	
F (1). Cross drainage works ..	67,785	26,644	26,645	33,596	
G. Bridges	23,801	9,823	2,322	5,742	
L. Earthwork	1,40,655	57,050	57,050	80,689	
K. Buildings	2,911	583	583	1,528	
O. Miscellaneous	2,270	589	589	1,239	
Main Channel, 2nd Reach.					
B. Land	5,710	2,000	3,980	3,987	
F (1). Cross drainage works ..	38,280	12,610	12,610	12,685	
G. Bridges	5,700	4,725	4,725	4,725	
L. Earthwork	49,200	41,068	41,068	43,447	
Main Channel, 3rd Reach.					
A. Preliminary expenses ..	299	..	299	299	
B. Land	16,745	12,000	10,693	10,693	
D. Regulators	3,460	1,039	1,039	1,039	
F (1). Cross drainage works ..	98,860	32,453	32,453	32,453	
G. Bridges	10,500	3,457	3,457	3,457	
L. Earthwork	71,665	55,364	55,364	55,380	
Main Channel, 4th Reach.					
A. Preliminary expenses ..	1,050	..	900	900	
B. Land	8,455	8,455	..	..	
D. Regulators	1,150	10	10	10	
F (1). Cross drainage works ..	12,380	381	381	381	
L. Earthwork	8,395	7,875	7,875	7,875	
Main Channel, 5th Reach.					
B Land	10,975	4,000	..	..	
F (1). Cross drainage works ..	45,190	1,360	1,360	1,360	
G. Bridges	7,650	..	..	..	
L. Earthwork	29,035	4,264	4,264	4,264	
Main Channel, 6th Reach.					
B. Land	12,205	..	..	..	
F (1). Cross drainage works ..	32,960	..	..	..	
G. Bridges	2,460	..	..	..	
L. Earthwork	35,375	..	..	..	
Main Channel, 7th Reach.					
B. Land	5,315	..	..	..	
F (1). Cross drainage works ..	37,140	..	..	..	
G. Bridges	2,140	..	..	..	
L. Earthwork	22,405	..	..	..	
Main Channel, 8th Reach.					
B. Land	7,475	..	..	..	
F (1). Cross drainage works ..	12,380	..	..	..	
G. Bridges	3,670	..	..	..	
L. Earthwork	9,475	..	..	..	
Main Channel, 9th Reach.					
B. Land	810	..	..	..	
D. Regulators	1,150	..	..	..	
F (1). Cross drainage works ..	24,760	..	..	..	
L. Earthwork	5,660	..	..	..	
Main Channel, 10th Reach.					
B. Land	810	..	..	..	
D. Regulators	1,150	..	..	..	
F (1). Cross drainage works ..	24,760	..	..	..	
L. Earthwork	3,660	..	..	..	
Main Channel, 11th Reach.					
B. Land	7,890	..	..	..	
D. Regulators	1,150	..	..	..	
E. Falls and weirs	15,990	..	..	..	
F (1). Cross drainage works ..	91,320	..	..	..	
G. Bridges	2,380	..	..	..	
L. Earthwork	30,650	..	..	..	

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
	RS.	RS.	RS.	RS.	
Main Channel, 12th Reach.					
B. Land	3,600	..	..	..	
F (1). Cross drainage works ..	24,760	..	..	..	
G. Bridges	2,380	..	..	..	
L. Earthwork	4,260	..	..	..	
K. Buildings	10,026	2,142	2,142	3,434	
P. Maintenance	53,000	..	..	..	
(3) DISTRIBUTARIES.					
A. Preliminary expenses ..	8,950	265	265	7,930	
First Branch Channel.					
B. Land	16,250	2,500	8,798	8,798	
D. Regulators	1,150	926	936	936	
E. Falls and weirs	8,008	3,914	4,331	4,331	
F. Cross drainage works ..	5,480	..	..	..	
L. Earthwork	13,530	2,808	2,808	4,161	
Second Branch Channel.					
B. Land	810	810	..	..	
D. Regulators	1,150	957	947	957	
E. Falls and weirs	1,950	1,051	635	1,050	
F. Cross drainage works ..	2,740	395	395	395	
L. Earthwork	5,500	1,483	1,483	1,483	
O. Miscellaneous	1,270	..	..	..	
Third Branch Channel.					
B. Land	3,150	3,006	..	..	
D. Regulators	2,780	129	129	129	
E. Falls and weirs	8,700	..	..	..	
F. Cross drainage works ..	2,740	..	..	..	
L. Earthwork	9,240	504	504	504	
O. Miscellaneous	4,150	..	..	..	
Fourth Branch Channel.					
B. Land	8,100	..	..	..	
D. Regulators	6,050	..	..	..	
E. Falls and weirs	18,730	..	..	..	
G. Bridges	2,370	..	..	..	
L. Earthwork	37,750	..	..	..	
O. Miscellaneous	8,380	..	..	..	
Fifth Branch Channel.					
B. Land	2,525	..	..	..	
D. Regulators	1,630	..	..	..	
E. Falls and weirs	10,470	..	..	..	
F. Cross drainage works ..	1,500	..	..	..	
L. Earthwork	10,665	..	..	..	
O. Miscellaneous	2,590	..	..	..	
Sixth Branch Channel.					
B. Land	525	..	..	..	
D. Regulators	1,150	..	..	..	
E. Falls and weirs	5,740	..	..	..	
G. Bridges	790	..	..	..	
L. Earthwork	6,745	..	..	..	
O. Miscellaneous	1,930	..	..	..	
Seventh Branch Channel.					
B. Land	1,000	..	..	..	
D. Regulators	1,150	..	..	..	
E. Falls and weirs	4,590	..	..	..	
L. Earthwork	1,460	..	..	..	
O. Miscellaneous	1,280	..	..	..	
Eighth Branch Channel.					
B. Land	2,900	..	..	..	
D. Regulators	2,110	..	..	..	
E. Falls and weirs	7,750	..	..	..	
L. Earthwork	7,090	..	..	..	
O. Miscellaneous	1,930	..	..	..	
Ninth Branch Channel.					
B. Land	12,950	..	..	..	
D. Regulators	6,050	..	..	..	
E. Falls and weirs	38,930	..	..	..	

Statement showing the Progress of Capital Expenditure on Public Works, &c.—*cont.*

Name of project and description of work.	Amount of sanctioned estimate.	Grant for 1889-90.	Expenditure during the year 1889-90.	Total expenditure up to end of 1889-90.	Succinct account showing the state to which the works have been advanced up to date, &c.
Ninth Branch Channel—cont.	RS.	RS.	RS.	RS.	
F. Cross drainage works ..	16,440	..	..	..	
G. Bridges	3,500	..	..	..	
L. Earthwork	56,640	..	..	..	
O. Miscellaneous	14,870	..	..	..	
Tenth Branch Channel.					
B. Land	12,075	..	..	..	
D. Regulators	5,930	..	..	..	
E. Falls and weirs	36,260	..	..	..	
F. Cross drainage works ..	52,060	..	..	..	
G. Bridges	1,270	..	..	..	
L. Earthwork	66,225	..	..	..	
O. Miscellaneous	11,560	..	..	..	
Eleventh Branch Channel.					
B. Land	3,150	..	..	..	
D. Regulators..	1,630	..	..	..	
E. Falls and weirs	4,680	..	..	..	
G. Bridges	960	..	..	..	
L. Earthwork	13,150	..	..	..	
O. Miscellaneous	3,810	..	..	..	
Twelfth Branch Channel.					
B. Land	5,850	..	..	..	
D. Regulators	3,940	..	..	..	
E. Falls and weirs	2,040	..	..	..	
G. Bridges	3,020	..	..	..	
L. Earthwork	54,220	..	..	..	
O. Miscellaneous	9,930	..	..	..	
Rent or purchase of buildings for use in connection with the branch channels.	5,000	..	..	..	
Maintenance of works during construction.	40,000	..	..	..	
Unappropriated balance	..	..	..	..	
Total ..	39,66,133	5,71,720	5,52,225	10,70,856	
Unforeseen works	1,03,199	..	..	..	
Total, Periyár Project ..	40,69,332	5,71,720	5,52,225	10,70,856	

General Abstract.

System.	Amount of estimate.	Grant for 1889-90.	Expenditure in 1889-90.	Total expenditure.
Godávari Delta System.	RS.	RS.	RS.	RS.
Works	81,62,045	60,657	55,450	79,84,192
Establishment	19,97,796	13,183	12,192	19,55,578
Tools and plant	9,24,513	3,711	3,251	8,87,963
Loss by exchange	4,978	..	..	5,512
Suspense	..	..	143	— 556
Total ..	1,10,89,332	77,551	71,036	1,08,32,689
Less receipts on Capital Account	..	..	..	899
Net ..	1,10,89,332	77,551	71,036	1,08,31,790
Kistna Delta System.				
Works	1,07,30,994	4,14,195	3,99,797	67,39,133
Establishment	25,07,268	91,568	89,993	16,28,386
Tools and plant	6,68,043	5,206	350	4,62,713
Loss by exchange	20,000	..	..	9,929
Total ..	1,39,26,305	5,10,969	4,90,140	88,40,161
Less receipts on Capital Account	6,521	..	86	7,590
Net ..	1,39,19,784	5,10,969	4,90,054	88,32,571
Pennér Anicut System.				
Works	12,93,822	10,824	9,840	12,79,571
Establishment	3,19,636	2,375	2,263	3,16,247
Tools and plant	36,832	..	..	27,858
Total ..	16,50,290	13,199	12,103	16,23,676
Less receipts on Capital Account	37,501	..	..	7
Net ..	16,12,789	13,199	12,103	16,23,669
Sangam Project.				
Works	24,50,000	40,000	32,726	23,64,188
Establishment	4,85,000	7,129	6,316	4,68,421
Tools and plant	1,29,830	..	— 1,299	1,22,893
Loss by exchange	170	..	..	170
Total ..	30,65,000	47,129	37,743	29,55,672
Less receipts on Capital Account	65,000	..	..	48
Net ..	30,00,000	47,129	37,743	29,55,624
Kurnool Canal.				
Works	1,77,82,139	..	..	1,77,82,139
Loss by exchange	40,80,918	..	..	40,80,918
Less receipts on Capital Account	2,21,378	..	966	2,21,378
Net ..	2,16,41,679	..	— 966	2,16,41,679
Barur Tank Project.				
Works	3,19,600	25,800	25,287	3,02,486
Establishment	73,430	5,818	5,635	69,772
Tools and plant	6,970	534	..	6,883
Total ..	4,00,000	32,152	30,922	3,79,141
Less receipts on Capital Account	..	..	..	16
Net ..	4,00,000	32,152	30,922	3,79,125
Cauvery Delta System.				
Works	13,11,684	..	..	13,09,547
Establishment	3,08,220	..	..	3,07,837
Tools and plant	39,409	..	..	39,409
Loss by exchange	3,620	..	..	1,250
Total ..	16,62,933	..	..	16,58,043
Less receipts on Capital Account	8	..	21	1,982
Net ..	16,62,925	..	— 21	16,56,061

GENERAL ABSTRACT—*cont.*

System.	Amount of estimate.	Grant for 1889-90.	Expenditure in 1889-90.	Total expenditure.
	RS.	RS.	RS.	RS.
Srivaikuntham Anicut System.				
Works	10,59,051	..	..	10,50,679
Establishment	2,90,792	..	..	2,90,193
Tools and plant	11,677	..	..	10,524
Total ..	13,61,520	..	..	13,51,396
Less receipts on Capital Account	..	..	..	369
Net ..	13,61,520	..	..	13,51,027
Periyár Project.				
Works	40,69,332	5,71,720	5,52,225	10,70,856
Establishment	9,05,668	1,23,038	1,21,390	2,16,895
Tools and plant	4,50,000	55,242	66,854	3,16,638
Loss by exchange	..	..	..	..
Suspense	..	..	..	..
Total ..	54,25,000	7,50,000	7,40,469	16,04,389
Less receipts on Capital Account	..	..	1,404	1,404
Net ..	54,25,000	7,50,000	7,39,065	16,02,985
Grand Total ..	6,01,13,029	14,31,000	13,79,936	5,08,74,531

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Read—the following paper :—

Statement of Traffic on the Navigable Canals, Madras Presidency, for the half-year ended on 31st March 1890.

Systems, sections of systems, and names of canals.	Nature of cargo.	Half-year ended on 31st March 1890.								Half-year ended on 31st March 1889.								Remarks.
		Tolls and license fees.	Laden boats.	Tonnage.	Ten mileage.	Value of goods.	Number of			Tolls and license fees.	Laden boats.	Tonnage.	Ton mileage.	Value of goods.	Number of			
							Empty boats.	Passenger boats.	Passengers.						Empty boats.	Passenger boats.	Passengers.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
		RS.				RS.				RS.				RS.				
Chilka Lake Canal	Food-grains, salt, oil-seeds, nuts and oil, rafts (timber and bamboos), turmeric, jaggery and sugar, fruits, vegetables, fish—salt and dry, piece-goods and miscellaneous.	..	791	1,622	12,982	3,80,919	795	86	2,801	..	2,859	4,507	36,057	6,46,979	2,714	158	4,039	The trade in food-grains was abnormally high during the half-year ended on 31st March 1889 owing to scarcity in the Ganjam district.
Dumagudem Canal	Food-grains, salt, oil-seeds, nuts and oil, rafts (timber and bamboos), hemp, building materials, tobacco, tamarind, cocoanuts, skin and hides, and horns.	435	523	16,169	32,023	2,51,199	68	14	77	225	410	7,685	15,132	1,34,885	77	9	105	
Godavari Delta.																		
Eastern Section.																		
Bank canal	Food-grains, salt, cotton, oil-seeds, nuts, oil, hemp, building materials, railway materials, fuel, rafts (timber and bamboos), tobacco, indigo, turmeric, jaggery, sugar, tamarind, fruits, vegetables, cocoanuts, fish—salt and dry, piece-goods, skins, hides, horns, treasure, and miscellaneous.	9,298	209	3,027	66,392	80,251	183	633	5,470	8,924	179	2,093	52,841	73,178	183	856	9,756	Do. do. do.
Cocanada canal			3,458	58,617	1,494,223	68,00,062	2,596	4,108	47,746		3,475	56,475	1,187,168	56,22,385	2,111	4,379	45,941	
Sámalkót canal			640	7,136	217,953	5,89,145	468	206	473		981	13,568	342,489	6,52,889	592	281	325	
Mundapetta canal			624	7,434	77,713	5,41,168	722	1,092	11,968		428	8,530	82,182	2,41,904	590	566	8,755	
Coringa do.			616	8,240	178,342	6,87,034	526	789	8,414		557	7,490	184,095	4,35,334	510	721	7,120	
Injeram do.			72	852	1,704	34,080	133	..	..		54	682	1,376	27,280	90	..	..	
Total ..		9,298	5,619	85,306	2,036,327	87,31,740	4,628	6,828	74,071	8,924	5,674	88,838	1,850,151	70,52,970	4,076	6,803	71,897	
Central Section.																		
Gunnaram canal	Do. do. do. ..	4,465	455	7,230	220,873	1,59,533	327	518	5,456	1,758	318	5,840	147,250	82,014	258	487	4,560	The increase is due to the canals having been kept open this year to a later date than in the previous year.
Bank do.			228	2,618	52,172	1,39,021	129	284	2,379		125	2,089	51,933	66,484	87	206	1,752	
Amalapur do.			369	11,147	308,740	4,35,485	353	1,189	11,580		215	9,843	239,040	2,79,011	137	880	17,864	
Total ..		4,465	1,052	20,995	581,785	7,34,039	809	1,991	19,415	1,758	658	17,772	438,223	4,27,509	482	1,573	24,176	
Western Section.																		
Gostanaddi and Velpur canal ..	Do. do. do. ..	14,795	249	5,230	173,173	5,28,223	284	293	2,617	17,666	254	4,567	168,202	1,43,101	530	146	1,483	The decrease is due to the canal having been closed earlier in this half-year than in the corresponding half of the previous year.
Bank canal			275	3,469	80,310	3,32,908	362	96	668		229	3,387	76,950	67,016	305	80	564	
Narsápur canal			832	10,437	363,066	9,97,199	669	1,261	16,438		1,561	25,030	831,732	8,79,697	1,064	1,635	17,090	
Ellore do.			3,231	66,478	2,609,426	41,94,012	1,771	1,698	38,584		3,526	77,456	2,991,559	26,22,960	2,039	2,002	43,833	
Attili do.			90	2,021	24,976	78,887	83	505	4,948		154	3,610	44,327	1,00,170	118	604	6,624	
Venkiah and Weyeru canal ..			* 1,107	17,855	500,981	9,75,183	542	164	660		578	9,742	308,170	2,57,698	528	102	402	
Undi canal			351	11,177	138,783	3,14,745	313	870	7,804		454	13,109	161,367	3,79,449	433	870	7,225	
Total ..		14,795	6,135	116,667	3,890,715	74.21,157	4,024	4,887	71,719	17,666	6,756	136,900	4,582,307	44,50,091	5,017	5,439	77,221	
Total, Godávari Delta ..		28,558	12,806	222,968	6,508,827	1,68,86,936	9,461	13,706	165,205	28,348	13,088	243,510	6,870,681	1,19,30,570	9,575	13,815	173,294	
Kistna Delta.																		
Eastern Section.																		
Masulipatam canal	Food-grains, salt, cotton, oil-seeds, nuts, oil, hemp, building materials, fuel, timber, bamboos, piece-goods, metals, tobacco, indigo, fish—salt and dry, leather—skins and hides, shells, turmeric, jaggery, sugar, tamarind, fruits, vegetables, cocoanuts, horns, treasure, and miscellaneous.	5,333	874	20,364	1,570,513	16,88,718	513	2,367	36,563	4,869	898	24,525	1,437,525	13,45,669	513	2,554	35,314	Do. do. do.
Ellore do.			2,579	49,014	3,253,481	35,34,147	947	3,117	39,258		2,444	46,611	2,853,634	28,29,779	758	2,889	36,372	
Pamarru junction canal ..			1,155	11,338	106,279	6,94,209	623	42	186		468	5,291	34,341	1,94,613	258	37	44	
Polraz canal			816	9,939	132,924	7,63,560	538	184	255		494	5,557	48,255	2,36,394	334	55	65	
Bantumilli canal			61	968	7,855	26,281	70	41	61		4	197	1,405	2,491	5	1	..	
Total ..		5,333	5,485	91,623	5,071,052	67,06,915	2,691	5,751	76,323	4,869	4,308	82,181	4,375,160	46,08,946	1,868	5,536	71,795	
Western Section.																		
Commamur canal	Do. do. do. ..	6,137	2,071	25,646	1,932,108	29,09,853	1,306	1,311	7,013	7,314	1,678	22,290	1,649,786	29,16,754	1,233	1,091	5,444	
Nizampatam do.			348	3,948	177,612	1,69,112	443	66	115		421	3,961	184,673	1,09,165	397	28	99	
Bank do.			104	4,159	138,134	2,03,233	292	755	7,344		399	5,924	237,494	1,61,145	349	518	4,426	
Total ..		6,137	2,523	33,753	2,247,854	32,82,198	2,041	2,132	14,472	7,314	2,498	32,175	2,071,953	31,87,064	1,979	1,637	9,969	
Total, Kistna Delta ..		11,470	8,008	125,376	7,318,906	99,89,113	4,732	7,883	90,795	12,183	6,806	114,356	5,447,113	77,96,010	3,847	7,173	81,764	
Buckingham Canal.																		
Southern Section	Food-grains, salt, oil-seeds, nuts, oil, building materials, fuel, timber, bamboos, piece-goods, metals, fish—salt and dry, leather—skins and hides, shells, jaggery, sugar, fruits, vegetables, cocoanuts, treasure and miscellaneous.	14,261	2,538	15,152	536,833	2,33,730	2,036	77	377	13,456	2,752	17,568	531,762	4,84,970	2,291	84	380	
Northern Section	Food-grains, salt, oil-seeds, cotton, hemp, tobacco, indigo, turmeric, tamarind and horns.		6,255	69,612	6,378,623	66,18,441	3,769	940	18,404		6,182	71,693	5,109,144	73,33,648	3,963	1,293	15,366	
Total ..		14,261	8,793	84,764	6,915,456	68,52,171	5,805	1,017	18,781	13,456	8,934	89,261	5,640,906	78,18,618	6,254	1,377	15,746	
Kurnool-Cuddapah Canal ..	Food-grains, salt, cotton, oil-seeds, nuts, oil, building materials, fuel, timber and miscellaneous.	..	205	1,747	202,637	3,21,949	11	..	15	..	731	4,791	206,876	1,66,604	377	48	100	
Vedarniem Canal	Salt	30	..	..	..	..	137	8	..	23	259	2,593	87,790	1,43,228	154	8	..	There was no manufacture of salt at Vedarniem during this quarter, and all previously manufactured had been sent away before end of September.
Grand Total ..		54,754	31,126	452,646	20,990,831	3,47,82,287	21,009	22,714	277,674	54,235	33,087	466,703	19,304,555	2,86,36,894	22,998	22,588	275,048	

* The increase is due to many boats having passed by this canal into the Kistna system of canals *viâ* the Tadináda lock at end of the Polraz canal.

(Signed) H. E. CLERK,
for Chief Engineer for Irrigation.

ORDER—dated 29th July 1890, No. 410 I., Public Works.

Ordered that the above statement be forwarded to the Government of India.

(Here enter No. 411 I., dated 29th July 1890.)

(True Extract.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Superintending Engineer, I Circle.
" Do. do. II "
" Do. do. III "
" Do. do. VI "
" Examiner, Public Works Accounts.
" Revenue Department.

ENDORSEMENT—dated 29th July 1890, No. 411 I., Public Works.

Forwarded.

(By Order.)

(Signed) G. T. WALCH,
Ag. Secretary to Govt., P.W.D.

IRRIGATION.

Govt. of {1890} Madras

PUBLIC WORKS.

Dated July, 29th.

Recd. *Encl.*

G.O., 29th July 1890, Nos. 410 I., 411 I.

JULY.

Traffic on Navigable Canals

Forwarding the statement of — for the half-year ended 31st March 1890.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following paper :—

From C. VINCENT, Esq., Under-Secretary to the Government of India, Public Works Department (Civil Works—Irrigation), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 14th July 1890, No. 119 I.

In reply to your letter No. 335 I., dated the 18th June 1890, regarding the introduction of certain changes suggested in the Irrigation Revenue Report of Madras, I am directed to say that the Government of India has no objection to the continuance of the present system of exhibiting in column 6 of statement I-E the area actually irrigated, and in statement II the area charged as irrigated, provided a note is added to statement I-E to the effect that the figures relate to areas actually irrigated.

ORDER—dated 30th July 1890, No. 412 I., Public Works.

Communicated to the Chief Engineer for Irrigation for information and guidance with reference to G.O., No. 334 I., dated 18th June 1890.

(True Extract.)

(Signed) G. T. WALCH,
Joint Secy to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, Periyár Project.
To Superintending Engineers.
To the Examiner, Public Works Accounts.
„ Revenue Department.

IRRIGATION.

Govt. of {1890} Madras

PUBLIC WORKS.

Dated July, 30th.

Recd. *Encl.*

G.O., 30th July 1890, No. 412 I.

JULY.

Irrigation Revenue Report of Madras

Letter from the Government of India agreeing to the proposal for making certain changes in the —, communicated to the Chief Engineer for Irrigation.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Read—the following paper :—

From Colonel H. SMALLEY, R.E., Superintending Engineer, III Circle, to the Chief Engineer for Irrigation, dated Bellary, 10th June 1890, No. 674.

[*References.*—G.O., No. 343 I., dated 15th July 1889 ; G.O., No. 442 I., dated 12th September 1889 ; G.O., No. 569 I., dated 20th November 1889.]

I have the honor to report on the works under construction or in contemplation by the Mysore Government affecting interests in the Anantapur and Cuddapah districts of the Madras Presidency which I have just returned from inspecting.

2. I have had the opportunity of becoming better acquainted with what has been done, and what is being done, and what may be done hereafter than I had last year, having had interviews with the Amildar of Chik Ballapoor, the Sub-divisional officer, Chintamanipett, the Supervisor, Chik Ballapoor, the Overseer, Periasamudram, and the subordinate in charge, Boordagunta, and having visited the principal works which affect Madras interests on the Pápaghni, Chitrávati and Pennér rivers respectively.

3. Looking from east to west, on the accompanying tracing from the atlas sheets of the Great Trigonometrical Survey, the Pápaghni river is the first river with which we are concerned. I have reported on this in my inspection notes, dated 20th June 1889, printed in G.O., dated 12th September 1889, No. 442 I., but as there are some errors in those notes, I think it best to recapitulate here all that I have learnt about the works in this valley in order to make this report as full and clear and accurate as I can.

4. The first Mysore work above the Madras frontier is an anicut near Boordagunta, marked A-1 on the map, and about 10 miles above our Kondakur-Vyasamudram tank (No. 49 in the list of Imperial works in Cuddapah district). The body wall is 296 feet long, the height of crest above bed of stream is at deepest point 14 feet, the cross section is strong ; there are to be two under-sluices introduced in it, which were not allowed originally. The head-sluice cill is to be 4 feet below crest of weir. The top of banks to be 14 feet above crest. I could not ascertain what was calculated as the maximum flood level, but it would seem 6 feet to 8 feet are anticipated. The drop is directly on to the rocky bed of the stream. This anicut is to supply the Boordagunta tank, 4 miles distant on the left bank, which is to be enlarged so as to contain 57·50 units of water more than hitherto, capable of irrigating an additional 167 acres.

5. I must here correct an error in my former report : a unit of water stored in Mysore parlance is not 1,000,000 cubic feet as I supposed, but 2 × 4,840 square yards = 9,680 cubic yards = 261,360 cubic feet, considered enough for one acre per annum double cropped. They consider this tank would be filled three times yearly in future. Another error I have to correct in my former report is that I said the tank was not supplied by the river hitherto ; whereas the supply channel is old, and the Mysore authorities argue from this fact and from there being flood banks at the site of the anicut that there must have been a former work here, and that hence the present work is a restoration and not a new work ; but no work has existed here within the memory of man, and it is probable that the only work that ever did exist

here was a temporary dam made up every season, and nothing like the solid masonry wall now being erected to intercept every drop of water in the stream above it.

6. The present state of the work is that the head-sluice has been well advanced and the flood banks, but the anicut itself has hardly been commenced, only materials collected for it. The work cannot certainly be completed before the 31st March 1891. No orders have been given by the Mysore authorities to suspend the work, but progress has been hindered by sickness or other causes.

7. The effect of this work then will be to intercept *at least* water enough for 170 acres from the tanks below. That is the revenue side of the question. In an engineering point of view, it strikes me that the work is too contracted, that the length of the anicut is insufficient, and hence in heavy floods it will be liable to be turned and the water retained by it let suddenly loose down to the Madras tank 10 miles below. The work is only about 5 miles below the Venkatasa Sagra next mentioned, and if that should go in floods, this work would be almost certain to be turned. The perpendicular drop of 14 feet on to the rocky bed of the stream seems likely to affect the rock by wearing it into holes or developing cracks in it to the danger of the anicut resting on it. This however could be rectified by the addition of water cushions or an apron in steps if found required afterwards.

8. The next work we are concerned with is the Venkatasa Sagra, marked A-2 in the map, about 5 miles above the last work, and therefore about 15 miles above the Vyasamudram of Kondakur. This is the work reported on by me in G.O., dated 12th October 1889, No. 442 I., described as near the village of Koolaparthi. This is admittedly an entirely new work. It consists of a massive earthen dam thrown across the Pápaghni, the crest is to be 72 feet + bed of stream, F.T.L. eventually 63 feet, with two irrigation sluices both on the left bank, one at 50 feet level, and the other at 35 feet level. Weir to be 300 feet long. The bund is to be 20 feet wide at top, front slope $1\frac{1}{2}$ to 1 with stone revetment and backing 4 feet thick, rear slope 2 to 1. At first only a puddle wall across the stream from hard surface below the bed up to bed level was proposed; but now this has been altered and a perpendicular puddle wall 6 feet thick is to be placed in the centre of the bund from the hard surface up to the crest of the bund. The weir is not to be constructed till the tank has been tested, but the rocky site selected for it is to be left open for the present. The capacity of the tank at weir level is calculated at 600 units, and it is expected to fill $1\frac{1}{2}$ times in the year and to irrigate 930 acres.

9. The present state of the work is that the low level sluice has been almost completed, but the earthwork has not made much progress since my last inspection owing to sickness and failure of contractors and to water in the stream. The gap in the middle across the stream has not been touched. The work cannot possibly be finished before the 31st March 1891, and most probably it will not be finished before March 1892.

10. The effect of this work when eventually completed will be to intercept water enough for 930 acres for passing to tanks, &c., below it. In a bad year, a year of slight rainfall, this will certainly be very detrimental to the stream under the Kondakur tank and the direct irrigation from the river carried on below it. Then, in a year of extremely heavy rainfall, could the tank as designed be safely trusted? If it were to go, the escaping water would surely either carry away or turn the Boordagunta anicut before mentioned, and the united volume would rush on to the Kondakur tank, which would be full and perhaps overflowing already; it would almost certainly go too, and destruction would ensue all down the valley. The new Guntakal-Villupuram Railway crosses the Pápaghni only a few miles below Kondakur. This new tank is therefore practically a railway-affecting tank. There are therefore so many interests concerned that I think the Chief Engineer for Irrigation, Madras, ought to be allowed an opportunity of seeing the design and report for this work as being actually constructed, in order that if he considers the arrangements insufficient, the Madras Government may be able to induce the Government of Mysore to accept such additional measures for security as he may advise. It is quite possible alterations may be made by the Mysore authorities as the work goes on from time to time, as they have already been made in fact. The information I have obtained is only

from subordinates who may not know exactly what is contemplated by their superior authorities. The Mysore authorities have not given any orders to suspend operations here.

11. Next, as regards the works mentioned in my former report at Timmanaikan-halli, &c., above the new tank just described, I am now informed that none of these are new works, but restorations; and that being the case, I do not know that we have anything to say to them; only there are restorations and restorations, and if these tanks are to be nominally restored but practically much enlarged the *status quo* will be altered. I have not the details of them.

12. The next work I know of affecting the Vyasamudram tank of Kondakur is a new work on a branch of the Pápaghni, marked A-4 in the map. I have not the details, but it is said to be a small work. It has not been commenced yet.

13. Another work in contemplation is across another branch of the Pápaghni, marked A-5 in the map, and this would materially affect not only the Vyasamudram tank but also the Tsaddam tank (No 48 in the Cuddapah list), from which it would only be about 5 miles distance. This is all I can learn of works in the Pápaghni valley.

14. The next valley in order is the Chitrávati valley. The work in progress here is described by Mr. Clift in G.O., No. 343 I., dated 15th July 1889. It is marked B-1 on the map and is near Periasamudram on the trunk road between Bangalore and Bellary. It is called the Ramasamudram, and consists of a massive earthen bank thrown across a branch of the Chitrávati, similar in character to the Venkatasa Sagra across the Pápaghni. The estimated cost of the work is Rs. 70,000. The crest of the bund is to be 72 feet + bed of stream, F.T.L. 60 feet. Length of weir 400 feet. Two irrigation sluices right and left banks at level of 30 feet. Bund to be 20 feet wide at top, front slope $1\frac{1}{2}$ to 1 revetted with stone and backing to a thickness of 4 feet and coming up to within 3 feet of the top; rear slope 2 to 1. Unlike the Pápaghni work this is to have a masonry core wall 2 feet 3 inches thick and 3 feet to 4 feet 6 inches high according to position across the bed of the stream; and there are to be three puddle walls in the bund, one in centre and one on each side midway between centre and toe of bund from hard bed up to surface of bund. The capacity of the tank at weir level is 1,207 units; and it is expected to fill only once in the year. The acreage to be supplied is approximately 1,000 acres. The catchment area is 47 square miles. The maximum water calculated to pass over the weir is 3 feet depth. This work was begun in February 1889 and is expected to be completed two years hence.

15. At present the work seems practically suspended, but not in consequence of the representations of the Madras Government, but from sickness and failure of contractors. The earthwork has been partly done on the sides of the stream with revetments, but the gap in centre has not been touched yet, and the masonry works have not been begun but only materials collected.

16. The effect of this work will be to intercept water enough for 1,200 acres passing down to the Madras tanks below. It is true the Bukkapatnam tank is more than 40 miles below this work, but, as Mr. Clift points out, the rainfall on the Mysore side of the frontier is double what it is on the Madras side. Then again, if this tank were to burst in heavy rains, the consequences would probably be fatal to the Bukkapatnam tank first, and the Dharmavaram tank afterwards, and here also (at Dharmavaram) the Guntakal-Villupuram Railway crosses the Chitrávati. In this case also I think the design is being actually constructed and the report should be seen by the Chief Engineer for Irrigation, Madras.

17. I cannot learn anything of the work mentioned by Mr. Clift in his para. 9 said to be proposed on this river at Cirkúr, 4 miles above Bujapalli—see map marked B-2. It is certainly not in progress; that is all I can learn. There is no other work in progress or in contemplation by the Mysore Government in the Chitrávati valley as I am informed.

18. The next and last valley in order is that of the Pennér. Here, at a village called Kottagárlahalli, about 7 miles from Chik Ballapoor, a tank named the Strinivasa

Sagra is being thrown across the northern branch of the Pennér close under Nandidroog, marked C in the map. This has not been previously reported on, and the work is quite of a different character to the two other large tanks being constructed on the Pápaghni and Chitrávati respectively. Instead of throwing an earthen bank across the stream, a masonry wall is here under construction 400 feet long and with its crest at 42 feet + deep bed. The width of the dam at top will be nearly 14 feet, front face with a slight batter, and rear face wall with a batter of $1\frac{1}{4}$ to 1. The wings and bunds on the flanks are to be 10 feet + crest. There are returns to the wings in rear. The bunds are to be rivetted with stone and backing 4 feet thick to within 2 feet of the top, front slopes $1\frac{1}{2}$ to 1, rear slopes 2 to 1 and 20 feet wide at top with a puddle trench at ground level in centre of bund 3 feet wide and 4 feet deep. The length of the bund is 2,178 feet exclusive of the dam. The dam is to be solid without under-sluices (though originally designed to have them). There are to be three irrigation sluices, one on the left bank at 30 feet below crest level, one on the right bank at the same level, and another at 15 feet below the crest. The work is flanked by hills on both sides. The catchment area is 35 square miles. The capacity of the tank at weir level (the weir is the dam) is 609 units, and the tank is expected to fill three times a year. There are 2,000 acres to be irrigated under it. It is entirely a new work. It was begun 18 months ago, and is expected to be finished in another 18 months. It is in good progress. The materials of the dam are rubble stone in surki mortar pointed with Portland cement. The surplus is to be discharged over the dam sheer down on to the rocky bed below. There are no passages for escape allowed in the flanks of the bunds.

19. This work does not affect Madras interests so much as those on the Pápaghni and Chitrávati. We have no anicuts across the Pennér till we come to Adinimayapalli where the Kurnool-Cuddapah canal crosses the river. If the projects called the Hindupur, Roddam and Bookacherla projects from this river had ever been carried out, they would have been seriously affected by this work. As it is the tanks affected by this particular branch of the Pennér are those in the neighbourhood of Hindupur, viz., Hindupur, &c.,* which either have channels with open heads from the river or are connected with those that have.

* Nos. 44, 45, 46, 57, 58 and 64 in the Anantapur list.

20. As for the engineering features of this work, it is a very bold idea to pass the surplus with a drop of more than 40 feet on to the bare rock below. The rock would assuredly be hollowed out or split up to the danger of the foundations of the dam. In my opinion either the dam ought to be built up above maximum flood level and the surplus passed round one or both flanks of the bunds, or a series of artificial pools should be formed below the dam to break the fall of the water and carry it off gently to the lower reach.

If this work were to be breached in heavy floods it would be certain to occasion damage to the tanks about Hindupur by causing the river to overflow its banks and inundating the country as the river would be in high fresh at the same time. I have no information as to whether other works are under construction or in contemplation on the other branches of the Pennér in the Mysore province.

21. In conclusion, these works appear to have been undertaken by the Mysore authorities under an erroneous impression that they were at perfect liberty to utilize to the fullest extent the natural water-courses flowing through their territory. This general proposition the present Resident has rightly declared untenable, and that they have no right to interfere with such water-courses in any way that may be detrimental to the interests of subjects of another power lower down their streams. In England, by standing orders of Parliament, notice of intended application for a bill affecting any streams must be served on all the mill-owners for a distance of 20 miles below the point at which the water is proposed to be abstracted, or down to such point as the river may become navigable. Any one who has served in the South Arcot district knows the extreme watchfulness the Government of Pondicherry exercises on the action of the British Government with regard to waters above the frontier affecting the French possessions below. As Mr. Clift puts it, supposing by any possibility the

Swiss Government should so alienate the waters of the Upper Rhine at Schaffhausen as to interfere with water privileges and navigation below, would not the Chancellor of the German Empire take very prompt and stringent measures to bring the Swiss Government to their senses ?

Statement showing Irrigation Works supplied from Chitrávati River, Madras Presidency.

Name of work.	Ayacut acres.	Assessment.	Cultivation during last five years.			Average of last five years.	
		RS.		ACRES.	RS.	ACRES.	RS.
I. Imperial Works.							
Bukkapatnam tank (No. 27 in Imperial list).	2,946	19,357	1884	1,090	7,132	2,212	15,416
			1885	1,220	7,827		
			1886	2,916	23,011		
			1887	2,919	21,738		
			1888	2,915	17,374		
Dharmavaram tank (No. 36 in Imperial list).	1,454	9,885	1884	329	242	916	6,270
			1885	35	184		
			1886	1,400	9,574		
			1887	1,403	9,585		
			1888	1,417	9,625		
II. Minor Tanks under the Revenue Department	..	..	..	..	..	..	..
Total ..	..	..	..	..	..	1,034	6,053
III. Minor Channels under Revenue Department	..	..	..	..	..	..	..
Total ..	..	..	..	..	..	4,232	13,390

Bellary,
10th June 1890.

(Signed) H. SMALLEY, Colonel, R.E.,
Superintending Engineer, III Circle.

Cuddapah Division.

List of Irrigation Works in the Valley of the Pápaghni of the Madras Government affected by the Mysore Works.

Item number.	Name of work.	Number of Imperial work.	Ayacut.	Assessment.	Average cultivation.	Average revenue for the last 5 years.	Remission for want of water for the last 5 years.	Surplus discharge.	Wier length.	Depth of water passing.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12
	Imperial Works.			RS. A. P.	RS.	RS. A. P.					
1	Kondakur-Laddam tank	48	221	1,270 0 0	228	1,316 3 4	..	..	..	..	*N.B.*—In the 10 years 1880—89 inclusive Kondakur tank surplussed only in 4 years, viz., 1883, 1887, 1888 and 1889.
2	Kondakur-Vyasamudram tank	49	1,396	12,971 0 0	1,378	11,321 0 0	..	..	..	..	
3	Idupula channel	54	307	2,939 0 0	224	3,702 9 7	..	..	..	..	
4	Nandimandalam channel..	55	302	2,871 0 0	287	3,861 6 4	..	..	..	..	
5	Ambavaram-Thalaparisa channel ..	56	173	804 0 0	..	..	..	..	..	..	
6	Ambavaram tank	68	173	804 0 0	..	..	..	..	..	..	
7	Peddacheppali calva	57	252	2,316 0 0	257	2,463 6 4	..	..	..	..	
8	Pugidu calva	58	199	1,106 0 0	215	2,011 12 9	..	..	..	..	
9	Vallur channel	59	305	2,261 0 0	..	..	..	..	..	..	
10	Thapatla river channel	60	281	2,119 0 0	..	..	..	..	..	..	
	Total, Imperial ..	..	3,609	29,461 0 0	..	..	..	..	..	..	
	Minor Works.										
	Madanapalle taluk	..	84·90	320 14 2	..	..	..	..	..	..	
	Kadiri taluk	..	1,085·24	5,953 1 6	..	..	..	..	..	..	
	Ráyachóti taluk	..	25·65	108 7 0	..	..	..	..	..	..	
	Pulivendla taluk	..	1,969·05	18,930 3 9	..	..	..	..	..	..	
	Cuddapah taluk	..	2,740·56	25,965 14 5	..	..	..	..	..	..	
	Total, Minor ..	..	5,905·40	51,278 8 10	..	..	..	..	..	..	

Bellary,
10th June 1890.

(Signed) H. SMALLEY, Colonel, R.E.,
Superintending Engineer, III Circle.

No. 105 I.

Submitted to Government with a recommendation that a copy of the letter and its enclosures be forwarded to the Government of India in continuation of letter No. 367 D., dated 2nd July 1890.

Ootacamund,
22nd July 1890.

(Signed) G. T. WALCH,
Chief Engineer for Irrigation.

To the Acting Secretary to Government,
Public Works Department.

Order—dated 31st July 1890, No. 413 I., Public Works.

Ordered that the following letter be sent to the Government of India.

(Here enter No. 414 I., dated 31st July 1890.)

(True Extract.)

(Signed) G. T. WALCH,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 31st.

Recd. *Encl.*

G.O., 31st July 1890, No. 413 I.

JULY.

Irrigation Works

Ordered that the report of the Superintending Engineer, III Circle, on the—under construction or in contemplation by the Mysore Government affecting interests in the Anantapur and Cuddapah districts, be forwarded to the Government of India.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Letter—from

G. T. WALCH, Esq.,
Joint Secretary to the Government of Madras,
Public Works Department,
Irrigation Branch,

To

The SECRETARY to the GOVERNMENT of INDIA,
Public Works Department.

Sir,

In continuation of my letter No. 367 D., dated 2nd July 1890, I am directed to forward copy of Proceedings of this Government, No. 413 I., dated 31st July 1890.

I have the honor to be,
Sir,
Your most obedient servant,

(Signed) G. T. WALCH,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

Ootacamund,
31st July 1890.

IRRIGATION.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 31st.

Recd. *Encl.*

31st July 1890, No. 414 I.

JULY.

Irrigation Works

Forwarding report of the Superintending Engineer, III Circle, on the — under construction or in contemplation by the Mysore Government affecting interests in the Anantapur and Cuddapah districts.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper:—

From J. HANNAN, Esq., Superintending Engineer, II Circle, to the Chief Engineer for Irrigation, dated 7th July 1890, No. 230 N.L.

With reference to your memo. No. II/24 N.L. of 26th March 1890, I have the honor to resubmit the completion report with the heading altered from "Completion Report for Kanigiri surplus weir" to Completion Report for completing the weir, and with a memorandum attached explaining what work was done.

2. I was wrong in stating that no estimate was received for the above work. One was submitted by Mr. O'Connell on 14th June 1889 after the work was completed and it was returned unsanctioned, and he was requested to submit instead a completion report.

Enclosure.

MEMORANDUM.

A completion report was submitted for the work done to beginning of 1885 when work was stopped. The completion report now submitted is for the completion of the work.
3rd July 1890. (Intld.) J. H.

Blasting work in the approach and escape channel and clearing the site were commenced in 1882 and work in accordance with the original estimate proceeded with up to the beginning of 1885. Cill stones for the shutters had been laid and fixed throughout and raising the piers commenced, when orders were received to stop further work until the tank bund had been tested and the question whether the originally proposed full tank level could be safely adhered to had been finally settled. Final orders were received in Chief Engineer for Irrigation's memo. No. II/30 N.L. of 10th July 1887, and in para. 8 of the Chief Engineer for Irrigation's inspection notes embodied in G.O., No. 549 I., of 19th September 1889.

2. The work which had to be carried out and for which this completion report is submitted was the superstructure as per original design, but the four northernmost vents instead of being fitted with screw-gearing shutters were blocked with stone in mud walls. These four screw-gearing shutters were fitted on to northern end of the masonry dam, and the final estimate for the masonry dam included the cost of fitting these up.

3. A tracing of the work is enclosed.

(Signed) H. O'CONNELL,
Executive Engineer, Nellore Division.

Nellore,
12th May 1890.

Order—dated 31st July 1890, No. 415 I., Public Works.

The outlay of Rs. 3,858 incurred in completing the Kânigiri reservoir surplus weir is approved and will be met from the balance of the amount reserved for unforeseen works of the Sangam anicut project, which will then be reduced to Rs. 26,826.

2. This sanction has been registered as No. 40 I. of 1890-91.

(True Extract.)

(Signed) G. T. WALCH,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, II Circle.
„ Examiner, Public Works Accounts.
„ Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated July, 31st.

Recd. *Encl.*

G.O., 31st July 1890, No. 415 I.

JULY.

Kanigiri Reservoir

The outlay of Rs. 3,858 incurred in completing the — surplus weir, approved.